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Contributions.

Microscopic Examination of Bearing Metal.

To the Editor of the Railroad Gazette:

I note with interest in your issues of Feb. 25 and March 4 the articles relative to microscopic tests of composition metals, and would like to hear from practical users of composition metals for bearings their criticism in this direction. It strikes me as being something which would not only be interesting to the railroad fraternity, but very useful. If the facts mentioned can be sustained, I think it would be a proper subject to be brought before the railroad clubs throughout the country, and while I am an active member of some of them, I would prefer the matter to be brought to their attention through some other channel.

As I said before, I should be much pleased to have this criticised, and if half stated is true—and I have reason to believe they are facts—it should be in all specifications for journal bearings, for cars as well as locomotive equipment.

STEAM.

Car Lighting with Acetylene Gas.

Pontiac Pacific Junction Railway Company,
Ottawa, Ont., March 10, 1898.

To the Editor of the Railroad Gazette:

Referring to your letter of Feb. 24 regarding car lighting with acetylene gas on the Pontiac Pacific Junction Railway: Some months ago, in conversation with the local agents, Messrs. Holland Bros., of Ottawa, Ont., for the Niagara Falls Acetylene Gas Generator, I suggested that acetylene gas would be a splendid lighting element for railroad cars if it could be utilized without danger. Mr. Andrew Holland, one of the proprietors, asserted positively that he could light the cars safely and brilliantly with one of the generators used for house lighting. The problems to be met were:

First.—The effect of intense frost on the gas machine and on the gas when piped between cars with rubber hose and when the train was running 30 or 40 miles an hour with the mercury away below zero.

Second.—The effect of vibration of cars on rough track on the steadiness of light.

Third.—The danger of gas escaping from the generator by the agitation of the water in the gas tank.

Fourth.—The slopping over of water from the gas tank on the floor of the car and in consequence smell of escaping gas.

Shortly after this conversation I placed a train at Messrs. Holland Bros.' disposal for equipment. A 20-light generator was installed in the baggage car. The cars were temporarily piped for gas fixtures, and the first trial decided that three of the expected difficulties amounted to nothing in actual work—the tank and the gas were not affected by the frost; the lights were not affected by the vibration of the cars, and the illumination was more brilliant than on any train I have ever seen. I believe it to be the most brilliant light used to-day on any train in the United States or Canada.

On through mixed express, as we run on this line, with all the drawbacks of shunting, etc., causing slopping over from the water tank, etc., during our first experiments, the light is so far ahead of anything that we have yet seen in economy and convenience that we will never revert to the old system of lighting again. But where a train has to be broken occasionally and cars shunted, it can readily be seen that such a system could not be worked. Here, again, Messrs. Holland Bros. came to our assistance

and have installed a plant for us in our coaches that requires less carbide and avoids slopping and smell from gas, and is positively safe, because the gas is only generated in such small quantities, and under such low pressure, that the explosion of the amount generated at any one time (if such a thing could be) would not break a pane of glass. If the cars were to turn over the lights would go out, and the gas would simply pass away harmlessly into the air, as no fire could possibly result from it.

The plant is installed in the toilet compartment. It occupies a floor space of about 14 x 26 in. These generators have a capacity for six lights of 50 candle power each. The charging and attendance are so simple that an ordinary chore boy attends to ours without difficulty or danger. We propose to equip all our cars with the acetylene gas plant, as being the cheapest, safest and most brilliant illuminant for railroads yet discovered.

The carbide we use is manufactured by the Wilson Carbide Co., of St. Catharines, Ont. It costs \$60 per ton f. o. b. at the factory, and the lighting of one of our coaches with this light enables the passengers to read their evening papers from any seat in the car, and costs but 25 cents for a six hours' run.

P. W. RESSEMAN,
General Superintendent.

The Young Engineer and the Track Department.

Agricultural and Mechanical College of Texas,
College Station, Tex., March 2, 1898.

To the Editor of the Railroad Gazette:

Referring to the remarks of Professor W. F. M. Goss before the Western Railway Club, published in your issue of Feb. 18, I would like to mention, in addition to what he says concerning the value of a track laboratory, another reason why civil engineering graduates do not accept low positions in the track department on railroads, and that is that as our railroads are now conducted there is no hope held out to them that they will eventually be advanced above the grade of common laborers should they prove deserving—at least they would be given no preference over the uneducated trackmen with whom they would be associated. Too often college graduates overestimate their abilities and the value of their technical training and are apt to feel that their diplomas should be warrant enough for seeking at once the higher positions. If their instructors, however, would impress upon them the importance of an intimate knowledge of details and would give them to understand that the real value of their technical training lay in the advantage it gave them over their less fortunate fellows, by enabling them the more readily to fit themselves for higher positions, I think there would be no lack of such young men willing to take any position, however humble, that offered opportunity for advancement.

It may be of interest to mention an experiment that has been tried along this very line on the Southern Pacific Railway in Texas. The following letter is one of several received from Mr. E. B. Cushing, M. Am. Soc. C. E., Resident Engineer S. P. Ry., during the spring of 1894, and will explain the plan, which originated with him:

"We propose to establish on the line of the Southern Pacific a system of apprenticeship in the track department, the plan being to furnish employment for about a dozen young engineers in the capacity of track walkers. The duties of a track walker are to pass over certain portions of the road (from three to ten miles each day), to keep tight the bolts and to report any defects in the track which he cannot repair. He has to lend a hand with tools when necessary and to assist in general section work when not on his daily walk. The track walker is regarded as an assistant foreman, and we propose to pay these young men \$1.85 per day. Such as are worthy will be promoted in the proper time to section foremanships and will be given preference for promotion to vacant roadmasterships or assistant engineerships in the track department when qualified for such positions.

"Our idea is that in this way we shall not only secure roadmasters (and perhaps superintendents) thoroughly versed in the construction of the road and its maintenance, but will also furnish the engineering department with assistant engineers who know practically, as well as theoretically, all the features of this department. The work will of course be hard and we do not hope to have all who undertake it follow the lines laid down, but that out of a dozen we may secure three or four who will remain with us until they can reap the reward of their apprenticeship.

"You will see, therefore, that this is no place for society men or young men who expect to be chief engineers within a few months, but that there is an opening for those who really wish for advancement in the railroad service. Our experience has taught us there are very few of the large number of engineers applying for positions who are of any service beyond the mere instrumental service in their professions.

"I hope that the idea may strike you as a good one and that you will assist us in procuring these young men when needed."

My civil engineering students took kindly to the proposition from the first and there were more applications than openings. Those who were accepted went to work as section hands and were assigned to sections in Western Texas, where they worked side by side with Mexican laborers. If I am not mistaken they were paid \$1.50 per day at first, instead of \$1.85, as was originally intended. As opportunity offered they were transferred from one position to another so that they might become thoroughly conversant with all branches of the work, and so far as I

have heard they all remained with the road in spite of the hardships encountered. Only a few had been employed, however, before Mr. Cushing accepted the position of General Superintendent of the H. E. & W. T. Ry., and with the change in officers on the Southern Pacific came a change in policy, so that the same inducements are no longer held out to our young men. Recently I wrote to Mr. Cushing to ascertain how he had regarded the results of the experiment and in reply he states that as an experiment it was eminently successful, as far as it went. I quote from his letter of Feb. 26, 1898:

"I obtained permission to inaugurate the system and placed four young engineers on the road as laborers, from which positions they, by their own merits, worked out their own promotions and three of the four became section foremen. One is the foreman of a large extra gang and is giving the best of satisfaction; two others are still working as foremen and giving satisfaction, whilst the fourth, by his own merit and attention to business, attracted the attention of a large contractor, who offered him a position far more remunerative than he could hope to have for some time, hence he left the service. Thus you see that as far as the experiment went it was eminently a success, but a move of this kind will always meet with opposition from certain sources, and these young men labored under serious disadvantages, and the extent of the opposition was such that the plan is no longer carried on in the maintenance of way department. I have never changed my opinion that such a training as this, based on a thorough technical education, was the best qualification for responsible positions in the railroad service.

"I found no trouble in obtaining young men ready and anxious to work in these humble positions when they felt that they had assurance of promotion should their work merit it. Furthermore, I have always found that engineering graduates are anxious and willing to work in subordinate positions in engineering corps, and that they give better satisfaction as a general thing than the other men employed in this capacity."

If any experiments have been tried elsewhere along this line I should be glad to learn of their results.

J. C. NAGLE,

Prof. of Civil Engineering, A. & M. College of Texas.

The Death of Bessemer.

As we go to press news comes by cable of the death, in the 85th year of his age, of Sir Henry Bessemer. We shall not stop now to write any sketch of his life, and indeed that is hardly necessary, for very few men in the world are as well known to our readers. Bessemer's name will go down through the ages along with the names of Watt and Stephenson, as an epoch-making benefactor of mankind.

In 1854 Bessemer began the series of experiments which led to the discovery of the pneumatic process for making steel, and in 1858 he converted cast iron into cast steel and thus made an imperishable mark on the record of the history of mankind. In 1890, when Mr. Abram S. Hewitt received from the British Iron and Steel Institute the Bessemer gold medal, he took occasion to say that "the invention of printing, the construction of the magnetic compass, the discovery of America and the introduction of the steam engine are the only capital events in modern history which belong to the same category as the Bessemer process." The reduction in the cost of producing steel led to a great reduction in the cost of the machinery which carries on the operations of society, and especially in the cost of transportation. Mr. Hewitt estimated that in the one element of comfort the working classes of our day can earn and expend at least double the amount which was at their command in any previous age of the world, and this result appeared to him to be due very largely to the economies introduced directly by cheap steel and indirectly by other inventions which naturally followed the reduction of the cost of steel. Thus Sir Henry Bessemer became the great apostle of democracy.

Bessemer earned and merited all that he got. His immortal contribution to the welfare of humanity was the result of no accident, but of toil, self sacrifice, devotion and fortitude. He became very rich, but his personal fortune compared with the addition that he made to the wealth of the world was but as a grain of sand on the beach or one star in the sky.

The Chilean State Railroads.

The thirteenth annual report of the Director General of the Chilean State Railroads, though a bulkier work than its predecessors, has been more hastily prepared, and so little has been done in the way of analysis of the accumulated statistics that the Director General confesses the probable need of a supplementary report, which may appear later. The most interesting new feature introduced into the volume is a series of colored plates showing the passenger and freight movement, the relation between income and out-go, etc., by means of the ordinary block system, and the equilateral block system of plotting.

From the latter we see that the excess of income over expenses for the year 1896 (the year with which this report rather tardily deals) extends over the period from January to the beginning of June, when the expense-polygon overlaps the receipts-polygon, but in the latter part of November the balance again turns the other way. Or to state it otherwise, if we should assume the fiscal year to end in May it would

be divisible into two almost equal continuous periods, in one of which the roads are working at a profit, and in the other at a loss. The maximum profit is reached in March, in which month, with only one exception in nine years, there has been both the heaviest freight and passenger movement. This close correspondence between these two branches of traffic, which is noticeable throughout the whole year, is not a little remarkable considering that upwards of 80 per cent. of the population of Chile is urban, and that the projected system of rural service-roads (similar to the Sao Paulo system in Brazil) has not yet been called into existence.

The total freight carried amounted to 21,103,820 metric quintales (2,325,641 long tons), which is slightly less than in 1895, but the passenger movement has increased, amounting in 1896 to 5,610,736 persons carried. The decrease in traffic did not diminish the income from freights, owing to better facilities and more economical utilization of freight cars. By these improvements and by the establishment of through train service from Valparaiso to Victoria, an increase in net revenue of \$385,702 was effected. The live stock traffic yielded a gross sum of \$533,348, the shipments being distributed as follows: Cattle, 193,082; horses, 24,909; sheep, 177,423; and hogs, 32,968. In passing we may call attention to the apparent excellence of Chilean porkers, which we estimate from this report to have an average weight of 719.5 pounds.

One of the serious disadvantages of the Chilean railroads, as of all industrial enterprises in that country, is the high cost of coal, which has been mentioned in previous reports of the Director General. In 1895 this item consumed the funds of the railroads at the rate of \$16.77 per ton. The present administration has been fortunate in reducing the cost to \$14.93 per ton, but even so a total payment of \$2,938,410 for coal alone, against a gross income from traffic of only \$13,126,272, is a serious matter. In the last number of the Boletín de la Sociedad Nacional de Minería of Chile, Dr. Francisco J. San Roman has ably dealt with the importance of developing intelligently the admirable resources in native cretaceous lignites, which, if done, would undoubtedly prove the most valuable single aid to the unfolding of the national industrial life of the republic.

The work of improvement of the permanent way still continues, nearly the entire system having been relaid with heavier rails, and rebalasted, while new sleepers, in considerable part creosoted, are being put down at the rate of over 200,000 a year. The only noteworthy increase in equipment is found in the motive power, to which 29 new locomotives built by the Baldwins and by Rogers have been added within the year, while three of English make were retired from service. The total available rolling stock consists of 260 locomotives, 259 passenger cars, and 4,031 freight cars. The work-shops connected with the railroad seem to be doing important work, a partial record for the year being building four locomotives, rebuilding two, and general repairs to 129; the building of five boilers, the reconstruction of an equal number, and repairs to 34; the building of three tenders, etc., etc.

The Director General, R. García R., who is clearly not in sympathy with the suggestions which have often been made in the Chilean press to lease the State roads to private corporations, points with pride to a profit over all expenses of \$609,505.68, which affords material for argument for the supporters of the State-owned system, that the railroads should be easily self-sustaining, like the post office, and no more.

The Railroads in Yellow Fever Epidemics.

At a recent convention to consider the proposition for the establishment of Federal quarantine regulations for more effectually preventing the spread of infectious diseases, Mr. E. L. Russell, Vice President of the Mobile & Ohio Railroad, presented a paper on the experience of his road during the yellow fever epidemic last fall. Mr. Russell is decided in the opinion that the blame for "shotgun" quarantines is largely attributable to railroad companies, because they are shortsighted in their methods of dealing with town and city authorities and negligent in not fully informing the public as to their plans. In time of epidemic a railroad company should have a comprehensive plan and should take the Board of Health and local officers into its confidence. In the epidemic of last year the Mobile & Ohio, after consultation with Dr. Hyer, former President of the Mississippi State Board of Health, established relay camps for its freight-trainmen. Under this plan "a train leaving Mobile for the North was handled by a Mobile crew to a point at least one-quarter of a mile beyond the first relay camp, where the train was stopped and abandoned, and this crew returned to their camp. Then a crew located at another relay camp at least one-quarter of a mile north of the point where the train was left would come forward and take charge of the train. It was arranged that if the fever should extend up the line, these relay camps should be located at a point beyond the place of infection. By this means

the crews never came into contact with each other. Dr. Hyer insisted that if the crews were never allowed to come into personal contact, and passenger travel was practically abandoned, that the freight business could be continued without any appreciable danger to the communities north of Mobile. The sequel proved that Dr. Hyer was correct in his conclusion."

The relay camp method was fully approved by Dr. Sanders, State Health Officer of Alabama, and by the Mississippi State Board of Health. The road received no freight at infected points for way stations north thereof and sold no tickets except to St. Louis. The towns and villages along the line were promptly notified and the road retained the confidence of municipal officers throughout the epidemic. By thus practically suspending passenger traffic the freight traffic was kept moving with reasonable freedom. Trains were run to and from Mobile during September, October and November and no fever germs were carried to any community on the line.

Mr. Russell believes, therefore, that with the relay method, freight business can be carried on during any yellow fever epidemic without danger to any community. In view of this conclusion and of the harmonious nature of his relations with the State health officers he is not in favor of a Federal quarantine. A Federal health board, liable to act without sufficient acquaintance with local conditions, might easily have caused much unnecessary suspension of business.

The Railway Signaling Club.

The regular meeting of this Club was held at Pittsburgh, Pa., on March 8. The attendance was about 30, and eight new members were elected. Vice-President Elliott (C. M. & St. P.) presided, and the acting secretary was Mr. Henry M. Sperry. Mr. Sperry made a rough calculation, from data furnished by members present, and found that they represented interlocking plants aggregating 13,000 levers.

Mr. Hansel, chairman of the committee which had been appointed to report on derails and electric locking, sent a letter recommending that no report on this subject be required at present. After the first use of electric locking, about 15 years ago, little in that line was done until within the past 12 months, but the electric locking recently put in aggregates much more than all the older installations combined, and as this work is new it seems not best to try to do much about standards or final recommendations just at present. That electric locking is now thoroughly appreciated and is engaging the attention of all, is indicated by the fact that three of the most important roads have put in derailing switches and electric locking at all the crossings they have equipped with signals during the past year.

The principal feature of the meeting was the paper by Mr. W. A. D. Short, published in the Railroad Gazette of last week, page 178. After the reading of the paper there was a desultory discussion on some of the points brought out. Mr. Keppel (P. R. R.) advised every one to beware of lead-covered cables. He has taken out over 15 tons of such cables which had become corroded to such an extent as to be worthless. Mr. Beach (N. Y., N. H. & H.) also condemned lead covering, preferring the ordinary braided insulation. Lead had deteriorated not alone where street railroad currents may have affected it, but at other places as well.

Several members agreed with Mr. Short's favorable opinion of the Weber insulated rail joint. Of one lot of about 900 in service for over two years, not one had needed any attention whatever. The question whether an automatic signal should or should not go to danger in the face of the engine-man being under discussion, members manifested conflicting views, but the strongest expressions were to the effect that the placing of such signals 150 ft. beyond the beginning of the block for the purpose of making the engineman an inspector of the condition of the signal, was decided upon years ago, when such signals were far less reliable than they are to-day; and the testimony of members connected with the Pennsylvania road, where automatic signals (electro-pneumatic) go to danger after the engine has passed, was to the effect that, having ample confidence in the working of the signals, they felt satisfied with their present practice. They thus avoid the anomaly of having an engineman treat a red signal as an indication to go ahead.

The Pennsylvania has now used electro-pneumatic block signals nearly 14 years. These signals are all on four-track lines. A length of two miles of road on the Pittsburgh division was put in in 1884; in 1888 this was increased to seven miles, three years later to 19 miles, and it is now being increased to 32 miles. The New York Division of the Pennsylvania will soon have about 70 miles, making 102 miles of road, or 408 miles of track worked under these signals. In all of the 14 years, no accident has occurred due to the failure of a signal.

Referring to Mr. Short's advocacy of putting bond wires inside the splice bar, several members advocated putting them outside so as to facilitate detection of failure by rust. The objection that wires

outside sometimes got pushed over the top of the rail and were cut off by wheels was answered by Mr. Keppel, who takes pains to have the wires so short that they cannot be pulled to the top of the rail. Mr. Wileman (L. S. & M. S.) uses a loop bond wire. He bores two holes in the web of one rail and one hole in the web of the other. The wire is fastened at one of the two holes, then run through the single hole and is returned to the second hole in the first rail.

Troubles from lightning being under discussion, it appeared that on the Pennsylvania this disturbance is not of sufficient consequence to warrant the use of fuses between the track and the relay. Mr. Elliott (C. M. & St. P.) has lightning arresters which give satisfactory service.

Mr. Street described the working of the electric train staff in New South Wales. The interlocking of semaphore signals with train staff apparatus being criticised, Mr. Sperry called attention to the danger of the practice of having anything in the nature of a signal which is not interlocked with other signals at the same station. In some quite recent installations, distant signals have been put up, duly interlocked with the switch or crossing signals, but not temperature below the surface is so equable that in near the cabin or telegraph office. This neutralizes the value of the distant signal, as the engineman, knowing the presence of the train order signal, can take no advantage of a clear distant signal; or if he does obey its indication, and run at speed, he disobeys the regulation governing the train order signal.

Mr. Haas, being given the privilege of the floor, described his packing joint for gas pipes used to carry signal wires under tracks and street crossings. Where a wire must be run a long distance below ground, he places it in a gas pipe and the pipe is filled with oil. At either end is a joint, packed so as to make it oil tight. Such pipes have stood two years without repacking. About 200 of them are in use on the New York division of the Erie. The temperature below the surface is so equable that in a wire running through a pipe 900 ft. long, the turn-buckle for adjusting the length of the wire has not been changed in two years. Mr. Wileman (L. S. & M. S.) also uses iron pipes filled with oil, but has no packing, the ends being raised sufficiently to retain the oil.

The protection of electric street railway crossings of steam railroads was taken up and informally discussed. The general opinion was that complete interlocking was necessary for efficient protection; that the practice at some places, where the street car conductor is required to go ahead, and, by pulling a lever, close a derailing switch, was a very poor one. There was no certainty that the conductor would use ordinary caution and assure himself that there was no train approaching. Although this practice might relieve the steam railroad of liability should an accident occur, still the accident would not be prevented as by complete interlocking.

On Tuesday evening the Club and their friends, to the number of about 40, were entertained at dinner at the Duquesne Club by the Union Switch & Signal Company, Vice-President Goodman doing the honors. The souvenir bill of fare was evidently prepared in the shops of the Union Company, some of the dishes being Facing Points, on Tie Plates, Broiled Back Lights, National Salad, Union Sauce, Spare Space Ribs, Leadout Onions, Permissive Peas, Bolt Lock Pudding and Pipe Carrier Pie.

On Wednesday the Club visited points of interest in and around Pittsburgh, as the guests of the Pennsylvania Railroad, a special train being run. The principal places visited were the Homestead Steel Works of the Carnegie Company, the Westinghouse Air Brake Works at Wilmerding, the Westinghouse Electric & Mfg. Company's works at East Pittsburgh and the Union Switch & Signal Company's shops at Swissvale. At the latter place all of the various signaling devices made by the company were shown to the visitors, including the iron post signal, with an aluminum blade, worked by a motor, which was described in the Railroad Gazette of Dec. 3, 1897. The officers and engineers of the company showed the working of the various instruments. One of the latest improvements is a new design of air cylinder for working electro-pneumatic signals. There is no change in principle from the old design, which has been used for the last 14 years, but great improvements have been made in simplicity of detail and forms of parts, and inspection and maintenance are made much easier. This new design is being used in the large number of block signals now being installed on the Pennsylvania. The new Pennsylvania signals will also be fitted with relays having the company's new patent safety device to obviate trouble from fusing of points by abnormal currents. The platinum points which close the local circuit are borne on a horizontal bar which is suspended beneath the usual armature lever and attached to it by a pivoted joint. If these contact points should stick together in consequence of fusing, they would become a fulcrum, and the dropping of the armature thereafter would depress the auxiliary horizontal bar at a point about midway of its length and cause it to break the local circuit at its

back end. Thus the entrance of a train upon the track circuit would release the signal from the all-clear position in spite of the failure of the lower contact point to separate from the upper one. In this relay the trunnions are jeweled and all the adjustments are permanently made before the instrument leaves the shop. The working parts are encased in a heavy glass box and the screws that hold the case together are sealed by the maker so that only an authorized inspector can make any change in the adjustment.

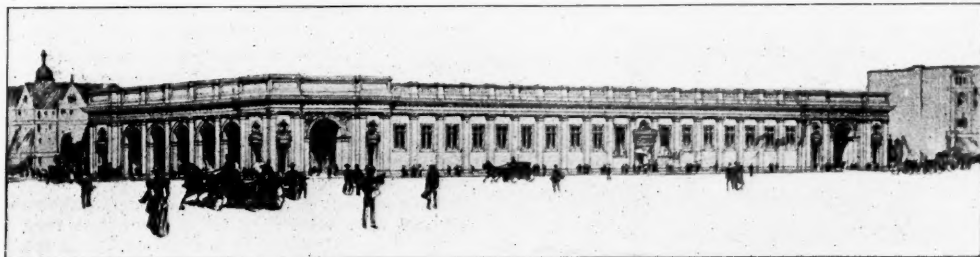
Railroad Engineering at the University of Illinois.

The University of Illinois has completed arrangements whereby it will be able to give considerable work in railroad mechanical engineering during the next few years. With Mr. William Renshaw, Super-

This work is being done at the suggestion of the Cleveland, Cincinnati, Chicago & St. Louis Railway.

A Rolling-Lift Bridge for the New York, New Haven & Hartford.

From time to time we have noted the letting of the contracts for carrying out of the plans for the new Terminal station at Boston, while a general description of the work was given in our issues of January 1 and January 8, 1897. An arrangement has just been completed whereby the Scherzer Rolling Lift Bridge Company, Chicago, is to design and supervise the construction of a through, rolling-lift bridge where the six parallel tracks of the New York, New Haven & Hartford cross Fort Point Channel near the entrance to the new station.



New Passenger Station of the New York, New Haven & Hartford at Dartmouth Street, Boston.

intendent of Machinery of the Illinois Central Railroad, Prof. L. P. Breckenridge is about to begin a series of tests to determine the effect of incrustation and scale on the efficiency of locomotive boilers. On account of incrustation, it is customary on certain divisions of the Illinois Central to replace the tubes of locomotive boilers about every 12 months, and it is desirable to know whether it would be economical to keep the tubes longer in service. The intention is to test the boiler of a new locomotive in the round-house at Champaign, Ill., and repeat the tests of the same locomotive at intervals of three months until the tubes have to be removed; the engine will be used in regular service between tests. The thickness of the scale on the tubes will be noted at the time of each test, together with the weight of scale on the tubes when they are finally removed.

Mr. J. A. Barnard, General Manager of the Peoria & Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis, has agreed to furnish facilities for making road tests, and the University in turn will supply the instruments for making measurements, taking observations and the assistants for doing the work. Prof. Breckenridge is now preparing plans for a very complete dynamometer car, which is to

There will be three double-track, single-leaf, rolling-lift bridges, having a clear span of 114 ft., which can be operated independently or together at will. Mr. F. S. Curtis, Chief Engineer of the New York, New Haven & Hartford, in selecting this type of movable bridge was strongly influenced by the successful working of the rolling-lift bridges at Chicago over the Chicago River. All of the Scherzer bridges so far built have been of the double leaf deck type.

The first of these bridges to be built on the Chicago River was completed in January, 1895, at Van Buren Street, and is a highway bridge 59 ft. wide, with a clear span of 109 ft. The second bridge built was completed in May, 1895, and carries the four tracks of the Metropolitan West Side Elevated Railroad, there being two double track structures, with a clear channel of 108 ft.; these can be operated either as one bridge or separately. Another rolling-lift bridge was finished in February, 1897, to carry North Halsted Street over the north branch of the Chicago River, which bridge has a clear opening of 121 ft.

The bridge for the Metropolitan elevated is of especial interest, as the road carries a heavy traffic,

tion of telegraph, telephone, sleeping car, express and fast freight lines. All concerns coming within these classes must send to the Comptroller General of the State, annually, a full statement of their capital stock, property, etc., and the State Board of Assessors must thereupon assess property within the state for taxation. There is a penalty for failure to send in the reports, and the assessors may require the appearance of officers of the companies with books and papers. The property of a company within and without the state is to be divided according to the mileage operated within and without. The State Board is to certify to the Comptroller General and he is to certify the assessments to each of the counties in proportion to mileage; and the auditors of the counties are to apportion the amounts among the several townships.

No. 63 prohibits unreasonable discrimination by telephone companies under penalty of double any excessive rate charged, the penalty to be paid to the subscribers or patrons of the company.

No. 82 is to regulate express and telegraph companies. These companies are placed under the control of the railroad commissioners, who shall have full power to regulate prices. All the existing railroad laws shall apply to express and telegraph companies, so far as applicable, and these companies shall bear their share of the salaries of the railroad commissioners, to be based on their gross earnings.

No. 175 is a law providing a penalty of \$100 for each day's failure on the part of a railroad company to post its rates in stations as required by the law of 1893.

No. 134 is the law requiring separate and equal accommodations for white and colored passengers. This law was reported in the Railroad Gazette of March 4, page 163.

The Back Bay Station of the New York, New Haven & Hartford at Boston.

In our issue of January 1, 1897, we published the plans of the great new terminal station of the southern railroads in Boston, now under construction at the foot of Federal street. As was then explained, the chief opposition to the selection of this site lay in the consequent loss of the Park Square station, which has always been the favorite among Bostonians, being admirably situated with respect to the convenience both of the business and the residential districts. But the Summer street site was adopted and "a passenger station * * * which shall be an adequate substitute for the present passenger station and facilities at Park Square" was provided for on land adjacent to Dartmouth street, on the "Back Bay."

The plans for this latter station, as finally adopted, show certain features of more than ordinary interest. The tracks being at this point more than 20 ft. below the street level, it has been decided to construct an overhead station. The space beneath the station will be occupied only by the platforms and the tracks. The latter are four in number, two of which, on the south side, are to be used for the suburban trains (which it is expected will be propelled by electric motors), and those on the north side for the through traffic. There will be two platforms, one between each pair of tracks, for the suburban and express trains respectively, and these two sets of tracks are to be separated from each other by a fence extending beyond the platform limits at each end. It will thus be impossible to cross from one platform to the other without going upstairs.

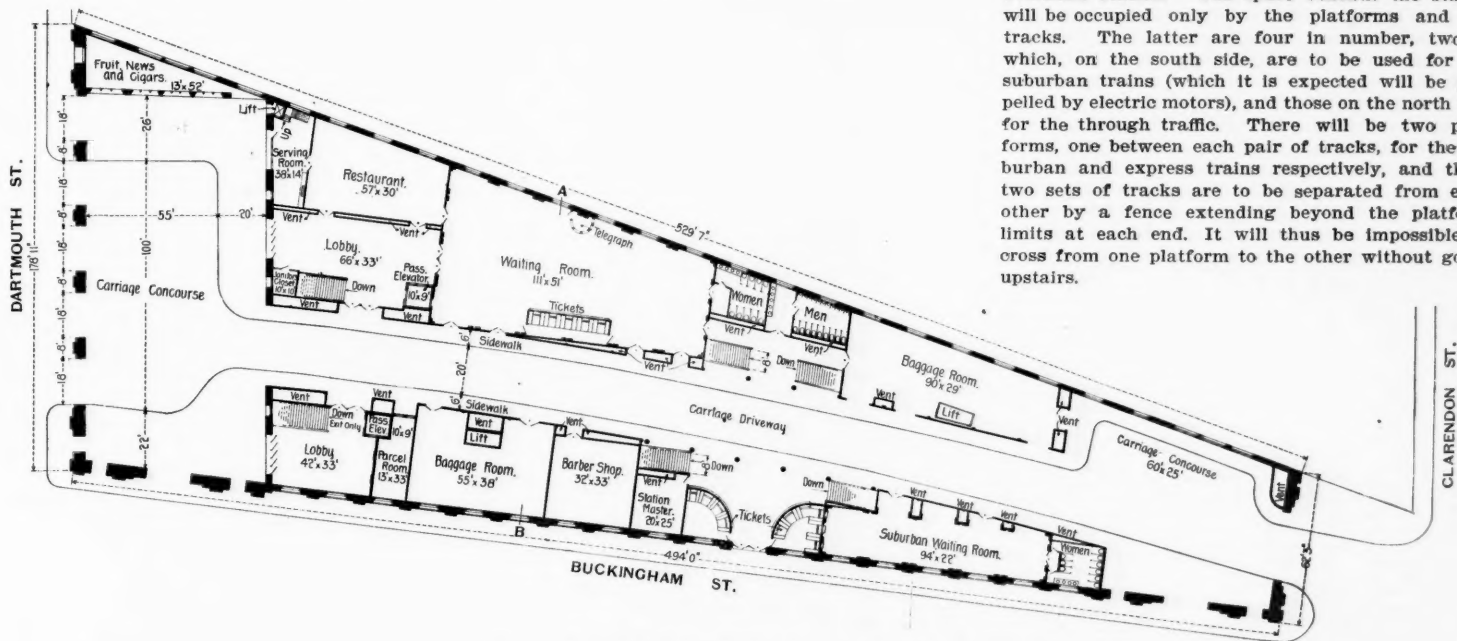


Fig. 1.—Plan of Back Bay Station, Boston—Street Level.

be built by the railroad for use in these tests. The intention is to devise self-registering apparatus, so that all the changes in conditions and operation will be recorded without the aid of observers, thus eliminating the personal equation as far as possible. It is expected that in this way some accurate and valuable data in regard to train resistance and engine performance will be obtained. The work so far laid out to be done with the dynamometer car on the Peoria & Eastern Division will take from five to six years.

Tests are now in progress at the mechanical laboratory of the University to determine the efficiency and conductivity of Serve tubes as compared with the plain tubes ordinarily used for locomotive boilers.

and it is essential that the bridge be operated rapidly. This bridge has now been in continuous service since its completion, and in this time there have been no repairs made of any consequence, and no delays to trains have occurred through the failure of the bridge, although about 1,200 trains cross it daily. As operated regularly it requires about 30 seconds to fully open the bridge and about the same time to close and lock it ready for the passage of trains.

Railroad Legislation in South Carolina.

The Legislature of South Carolina, recently adjourned, passed five general laws affecting transportation interests. Act No. 60 provides for the taxa-

The plan of the station building proper, directly over the tracks, is shown in Fig. 1. Its dimensions will be considerably greater than those of the present head house at Park Square; for while the latter, though sufficient for present purposes, is about 230x110 ft., the new station will have a length of nearly 500 ft., and an average width of 120 ft. Even the Park Square train shed will be more than replaced by the new station, for while the building is of about the same width, the platforms for through and suburban travel will have a length of 770 ft. and 890 ft. respectively, those at Park Square being only about 500 ft. in length. The building will cover the entire block included between Dartmouth and Buckingham streets and the Boston & Albany

tracks, as far as the extended line of Clarendon street, which is now cut in two by the tracks, but is intended to be carried through by the city on a long bridge. The principal front of the station will be on Dartmouth street, where there will be five arched entrances 20 ft. wide, but it will be accessible as well from the other (east) end (Clarendon street), and from the centre of the Buckingham street side. At the Clarendon street end it is intended to provide a handsome approach from Columbus avenue. Perhaps the most interesting feature of the plan is the carriage driveway and sidewalk through the centre,

there will be terra-cotta block partitions, probably sheathed with copper. Mosaic work will probably be used in the floors of the waiting rooms and lobbies, and the driveway will be laid with asphalt. The building will be amply lighted by the high windows (of which there are 18 on Buckingham street) and from the top. With regard to the rearrangement of the tracks, the most important feature perhaps is the location of the suburban apart from the express tracks, instead of one on each side of the latter, as is generally the case. This is made possible by the arrangement existing in the South Ter-

this matter at the next meeting of the directors. No decision has yet been arrived at, either by the railroad or the city, as to the disposal of the Park Square premises or the laying out of streets, but it is altogether probable that Clarendon street will be carried over the tracks. This of itself will greatly facilitate travel, as there is at present no passage from Columbus avenue to the Back Bay between Berkeley and Dartmouth streets, a distance of 1,500 ft.

The Standard Code on the Southern Pacific.

The Southern Pacific (Pacific system) has issued a revised edition of the book of rules for the operating department. The numbers of the rules conform to those in the latest edition of the standard code of the American Railway Association. The "general rules" are the twelve shown in the standard code. The "general regulations" are numbered from 51 to 177, the last 31 being special rules for trackmen, bridgemen and watchmen. All these regulations give evidence of having been prepared with great care and of having been amended in accordance with the personal experience of the officer who edited them. Among the cautions to trainmen concerning their safety we notice the following: "It is dangerous to assume that signals given to the engineer or fireman have been seen, or, if seen, that they will be obeyed, when obedience to those signals on the part of the engineer or fireman is essential to the safety of an employee in the performance of his duty. He must know that the signal has been seen, understood and obeyed before placing himself in a dangerous position. Otherwise he assumes all risk of danger arising from any misunderstanding or disregard of signals."

Rule 77 requires trains to stop before crossing drawbridges, crossings or junctions, unless they are protected by derailing switches as well as by interlocking signals. Under the rule requiring freight and extra trains to approach stations under control there is a provision that the foremost train shall send out a flagman in case of fog, etc., but that this does not relieve the following train from responsibility in case of collision. Conductors, in reporting flat wheels, are to give the name of the brakeman in charge. Rule 94 is as follows: "On all grades, when stopping on the main line or on a siding, when cutting an engine off a train at stations to do work, or at any stops of unusual length, the air must be released and a sufficient number of hand brakes set to hold the train. Both conductors and engineers will be held responsible for failure to comply with this rule."

Cars of live stock must be placed in the rear of trains. Live stock on interstate trips must be unloaded at least every 28 hours, and on trips wholly within a single State or territory every 36 hours. Way bills must show the date and hour at which live stock is loaded. Derailed cars must not be thrown down embankments or unnecessarily damaged merely to get them out of the way. Agents must make themselves familiar with the business interests of their town, etc., and must "acquaint the superintendent with such local news as may seem important."

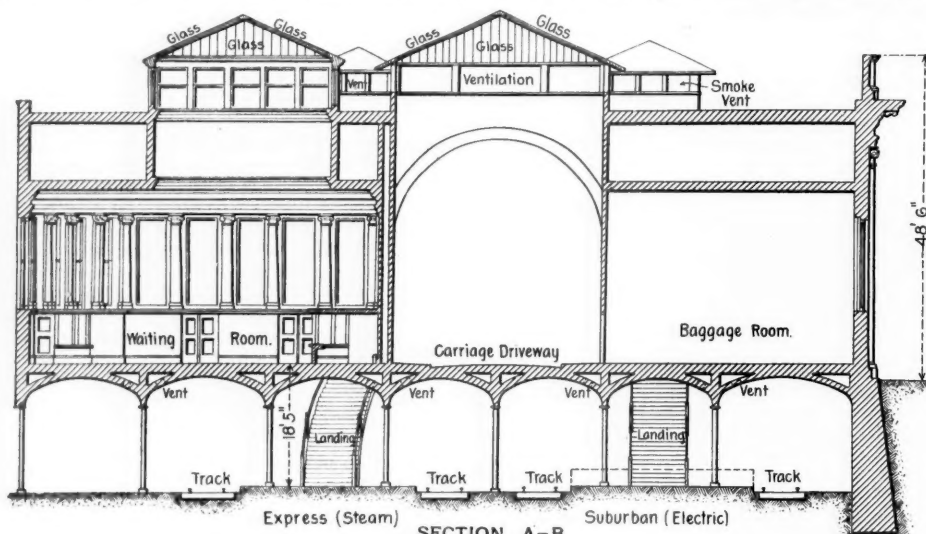


Fig. 2.—Back Bay Station, Boston.

dividing the station longitudinally into two parts, of which the northern will be used for through and the southern for suburban traffic, each of which has its own waiting and baggage rooms, ticket offices and other appurtenances, and platform below; while the northern portion has in addition a restaurant. At each end of the driveway will be a carriage concourse, that at the Dartmouth street entrance being 100 ft. x 55 ft. and the other 60 ft. x 25 ft.

The internal arrangements are shown in the plan (Fig. 1). The waiting rooms, 111 ft. x 51 ft. for through and 94 ft. x 22 ft. for suburban trains, will be considerably larger than those of the Park Square station, which are approximately 50 ft. x 60 ft. Each side of the station will be provided with three independent stairways, a baggage lift and a passenger elevator to carry 25 people.

The building will be of the Renaissance type of architecture, and will stand about 50 ft. above the street level. The height of the street floor above the tracks will be 19 ft. It is proposed to raise the train platforms for the suburban tracks to the height of the car floor, in the same manner as is to be done at the South Terminal station. Fig. 2 is a sectional elevation, which shows the relative heights and distances. The frame will be steel, made as light as possible to avoid jar from the trains. It is sup-

porting below on Z-bar columns, with continuous brick arches over and parallel to the tracks, and on the south side a heavy retaining wall, while the north side, adjacent to the tracks of the Boston & Albany Road, is left open except for a fence to prevent crossing the tracks. The spandrels in the haunches of the arches will be utilized as smoke vents (see Fig. 2), from which there will be exhaust outlets to the roof, as shown in Fig. 1. Above the street level the material on three sides of the building will be Bedford limestone, giving a massive appearance, and on the north side, facing the Boston & Albany tracks, a brick party wall. Internally

minal, where the suburban tracks pass under the others in a great loop, and issuing from the station are kept together on the south side of the steam tracks until after passing the Back Bay station. Just beyond the latter the northern or westbound suburban will cross both express tracks. The new station will necessitate taking some costly land. Its east end is about 125 ft. from Columbus avenue, which is south of Buckingham street. On the north side of Columbus avenue, besides the block on which the station is to stand, now covered by 25 brick dwellings and a large brick block facing on Dartmouth street, it will be necessary to remove the Hotel Edinboro, Columbus avenue, valued at \$200,000, as well as a fire engine house on the opposite side of Dartmouth street. A very large amount of excavation will also be necessary. An engineering feature is the temporary support of the northwest corner of the new building above the old tracks until the new tracks are ready for use as well as the similar permanent support of the southeast corner, where the tracks will run partly under Buckingham street for a short distance. These features, as well as the track locations and curvature, are shown in Fig. 3. The grade of the tracks will be level.

The construction of the station is in the hands of Mr. R. M. Berrian, Assistant Engineer of Construc-

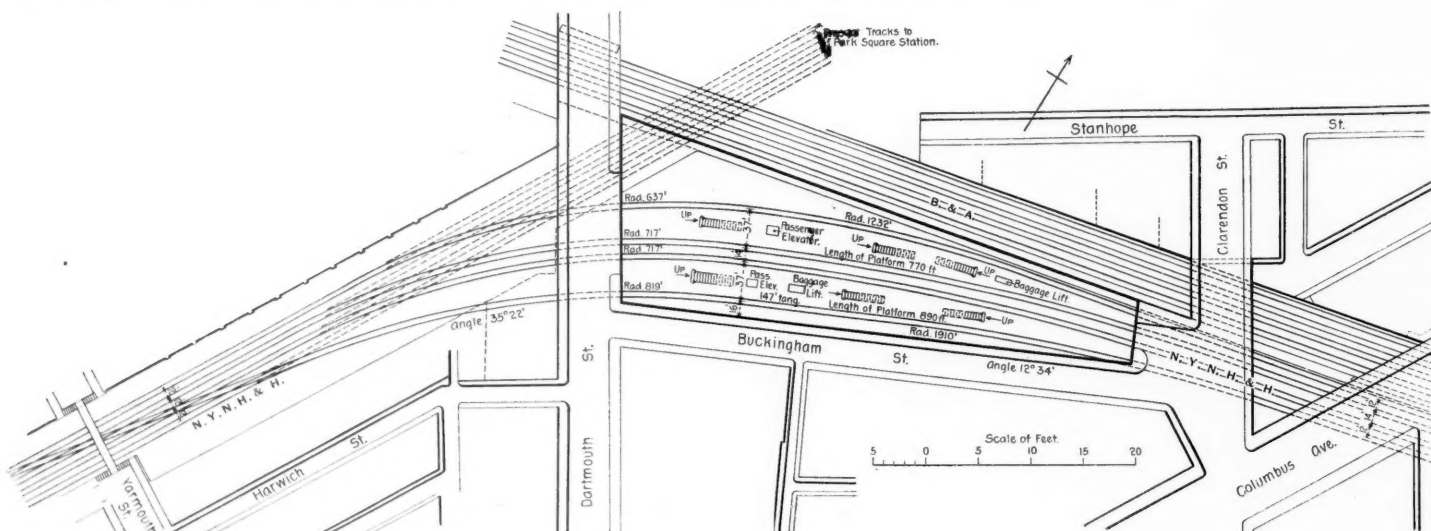


Fig. 3.—Track Plan—Back Bay Station, Boston.

ported below on Z-bar columns, with continuous brick arches over and parallel to the tracks, and on the south side a heavy retaining wall, while the north side, adjacent to the tracks of the Boston & Albany Road, is left open except for a fence to prevent crossing the tracks. The spandrels in the haunches of the arches will be utilized as smoke vents (see Fig. 2), from which there will be exhaust outlets to the roof, as shown in Fig. 1. Above the street level the material on three sides of the building will be Bedford limestone, giving a massive appearance, and on the north side, facing the Boston & Albany tracks, a brick party wall. Internally

tion, and under the general supervision of Mr. F. S. Curtis, Chief Engineer. The architects are Shepley, Rutan & Coolidge.

The legislative act of 1896 apparently contemplated a union station in the Back Bay, but the Boston & Albany has as yet taken no action in the matter. In default of a joint station the law requires the building of a separate station by each road, and the location defined for the Boston & Albany being adjacent to the new station here described, it is quite possible that the Boston & Albany station to be built will abut upon the latter, and like it be open at both ends. It is expected that action will be taken on

The rules for trackmen make special provision for sending out signals, when one gang of men works near another, so that engineers shall not be in doubt as to what work the signals refer to. In foggy weather trackmen working within a mile of the section house must walk to their work. When hand cars are run in time of fog, frequent stops must be made to listen for approaching trains. Hand cars must be examined for defects at least once a week.

In the time table rules, form 320 B is adopted. All trains running toward San Francisco are called west bound. The flag and lantern cuts shown in the standard code, pages 73 to 105, do not appear in the

Southern Pacific book; but under rules 336 and 337 there is a note requiring engines, when running backward, to carry a white light on the rear of the tender. Under rule 347 there is a note requiring three short blasts of the whistle, repeated, when a train enters a tunnel or passes under a low bridge, a snow shed, etc., to warn the trainmen on top of the cars. Extra trains, and regular trains behind time, are to sound

used. The pedestals and journal boxes are cast-iron, while the bearings are phosphor-bronze; coil springs are used over the journal boxes. In the centre at either end of the truck frame are spring draw-bars, chains and hooks. A heavy cast steel centre post is used, made hollow to allow for the shaft which operates the gearing for moving the car along the track.

from the top of the stack to the top of the rails, thus enabling the crane to pass through the door of any ordinary shop. The coal bunker and water tank are placed on opposite sides of the boiler and are constructed of steel, each having a capacity sufficient for 10 hours working.

The engines are of the vertical non-reversible type, and have double cylinders 7 in. in diameter by 9 in. stroke, balanced slide-valves and are mounted on a frame built of steel channels placed directly above the centre of the turn-table. Each cylinder has a separate exhaust pipe, thus reducing the back pressure on the pistons. The engine frame is 8 ft. high and is strongly braced on the side toward the boiler. In addition to the engines this frame carries much of the machinery which operates the hoisting boom and block. The hoisting boom is 21 ft. from centre to centre, giving an effective reach of about 22 ft., with a lifting capacity at this reach of about 2 tons, or 5 tons at 14 ft. The boom is made of 10-in. steel channels, strongly braced, with cast steel pivot bearings at the bottom, where the connection is made with the rotating frame. The hoisting block is of sufficient weight to overhaul the chain and gear when there is no load on the hook.

Directly forward of the engine frame at its top is the chain drum for raising or lowering the boom, while the main hoisting drum is placed near the bottom; each of the chain drums is grooved spirally to fit the hoisting chain, thus insuring smooth working.

All motions are transmitted from the engine crank shaft by friction clutches excepting that for altering the radius of the boom. The main hoisting drum, as shown in Fig. 1, is driven by a system of spur gears, which are connected to the engine shaft by a friction clutch placed on the end of the crank shaft and operated by a hand lever; in lowering, the drum is controlled by means of a lever which works the friction brake geared to and placed directly below the hoisting drum. On the right-hand side, shown in Fig. 2, a vertical shaft extends the whole height of the frame, being driven from the crank shaft by means of a pair of bevel gears. At the upper end of the vertical shaft is a pair of reversing bevel gears and a lock clutch which operates a worm gear; this gear in turn drives the drum for raising or lowering the boom, which operation is controlled by a suitable hand lever and alters the radius of the hoisting boom.

Toward the lower end of the vertical shaft, about on a level with the hoisting drum, is a pair of reversing cone friction clutches which operate, through a system of gears, a vertical shaft passing through the centre-post of the turn-table. This vertical shaft, by means of a pair of bevel gears, gives motion to

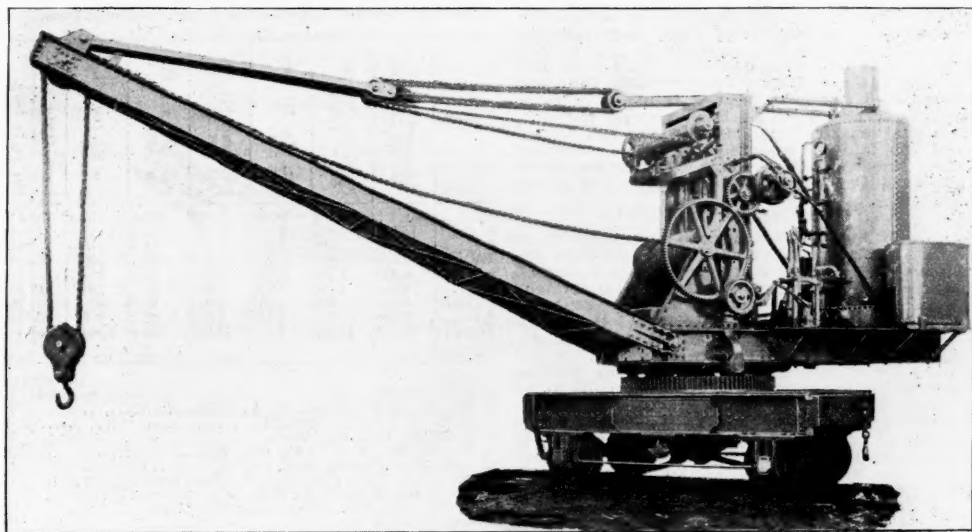


Fig. 1.—The Case Five-Ton Locomotive Crane.

the highway crossing signal repeatedly in obscure places.

The illustrations showing the lamp and hand signals are an improvement on those in the standard code, that showing the go-ahead motion being unmistakable.

Rules 701 to 705 relate to the use of automatic disk signals; rules 706 to 710 to automatic semaphore signals (electro-pneumatic), and rules 801 to 808 to mechanical semaphores. Each of these three styles of signals is illustrated in colors. Interlocking signals "are placed on posts painted red." When an automatic block signal remains at danger a train may proceed after waiting the specified time, never less than two minutes, but where such signal, remaining at danger, governs the movement of trains over railroad crossings or drawbridges, the conductor or person in charge of engine or train must send a man ahead to such crossing or drawbridge before passing over same with his train.

The rule with semaphore signals is for the upper arm to indicate for the high speed route, the next arm for the first diverging track to the right or to the left and the third and lowest arm for all diverging tracks not provided for by other signals; but at a junction the arms will be arbitrarily assigned by special rules.

Enginemen must report by telegraph whenever they find an automatic highway crossing bell that does not ring.

The rules for the use of air-brakes take up about 25 pages. These rules are accompanied by the usual drawings of apparatus, and include regulations for using the La Chatelier water brake and the Sweeney air compressor, which were described in the Railroad Gazette of Dec. 18, 1896. The rules for the air-brake proper have evidently been prepared with much care. As every one knows, the Southern Pacific used air-brakes on freight trains for a long time before such use was common in the East, and the rules are, therefore, to be taken as the fruit of extensive experience, and we shall not assume to criticise them. There are several features which might be differently stated for most of the conditions existing on Eastern roads. The instructions to trainmen require that where trains are made up, the brakes shall be tested by the rear brakeman, who is to make an application by opening the cock at the rear end of the last car. This is contrary to the usual practice, which is to make the test by an application on the engine.

A Five-Ton Locomotive Crane.

The accompanying illustrations show a locomotive crane designed and built by the Case Manufacturing Co., Columbus, O., for use in and around mill yards, stone yards, etc., having a lifting capacity of five tons at a reach of 15 ft., and weighing in working order 22 tons. Fig. 1 is a general view of the left-hand side of the crane, while Fig. 2 is a view of the right-hand side, showing the machinery in detail. It will be seen that the engines, boilers, hoisting boom and operating machinery are mounted on a turn-table platform which in turn is carried by a four-wheel truck.

The main truck frame is 10 ft. long, 6 ft. 6 in. wide and is built up of 15-in. steel channels; the floor consists of heavy cast-iron checkered plates. The wheel base is 7 ft. 6 in., the axles are of steel, with 4x7-in. journals, and chilled wheels, 24 in. in diameter, are

The truck carries a circular rack 6 ft. in diameter, securely bolted to the main frame; the teeth of this rack have a circular pitch of 2 in. Within the gear rim is a steel track upon which run the supporting wheels of the upper turn-table frame; the wheels are of steel, six in number, 9 in. in diameter by 3 in. long, and are fitted with steel gudgeons, which work in phosphor-bronze bearings.

The upper or rotating frame is of 13-in. steel channels. The end carrying the boiler extends about 8 ft. and the forward end 3 ft. from the centre of the turn-table. The turn-table frame is evenly counterbalanced upon the supporting wheels and shows no flexure when working under full load.

The boiler is of the vertical, multitubular type, 7 ft. 8 in. high, 42 in. in diameter and contains 82 tubes of 2 in. diameter. In testing the boiler a pressure of 175 lbs. per sq. in. was used, and it is stated that the boiler generates steam rapidly, a pressure of 80 lbs. per sq. in. being attained 30 minutes after start-

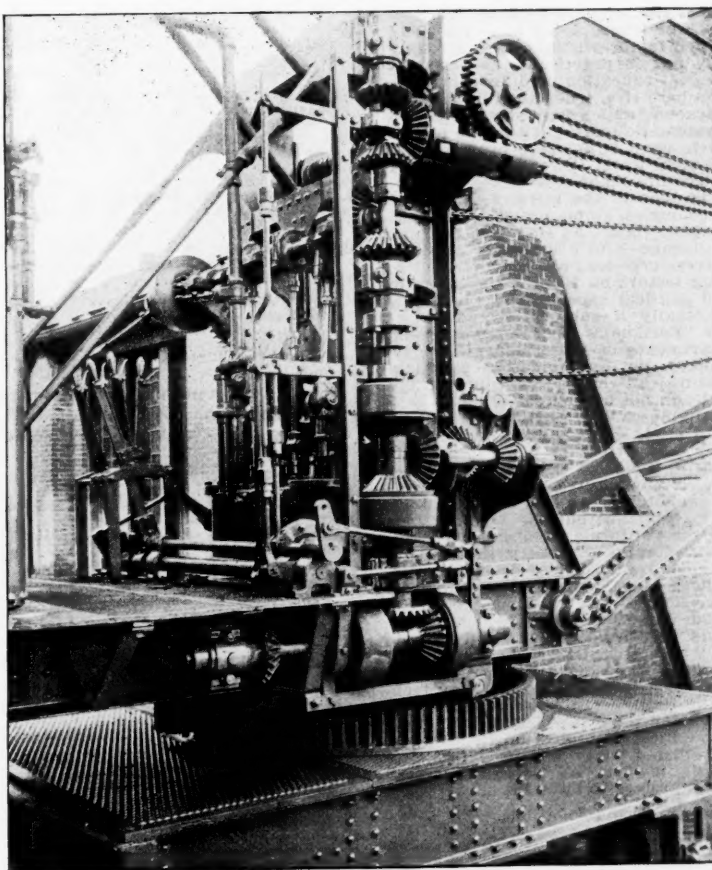


Fig. 2.—The Case Five-Ton Locomotive Crane.

ing the fire. Steam for the engines is taken from the boiler at opposite sides of the smoke chamber through double branch pipes so as to equalize the flow; the exhaust from the engines is discharged into the smoke stack and furnishes the necessary draft. The smoke stack is short, extending only a few inches above the engine frame, and measures 13 ft.

a horizontal transverse shaft journaled on the under side of the main truck frame, which carries sprocket wheels at either end. These sprocket wheels are connected by flat, link-roller-pin, steel chains to suitable sprockets mounted on one of the truck axles so that the crane can be moved in either direction along the track.

Through a set of bevel gears at the bottom end of the vertical shaft, motion is given to a short horizontal shaft placed on the side of the turn-table frame; on this shaft is mounted a pair of reversing cone friction clutches, controlled by a hand lever. By means of suitable gearing motion is transmitted from the horizontal shaft to the pinion which engages the teeth of the circular rack so that the upper turn-table frame can be rotated in either direction. The shafting throughout is of steel, the journal bearings are either of bronze or babbitt metal, and all journal boxes are fitted with adjustable caps for taking up the wear. The several parts of the operating machinery can be detached without disturbing other parts.

All the different motions of the crane can be made at the same time or separately, and all the controlling levers are placed so as to be convenient for the operator. The hoisting speed is about 35 ft. per minute, which can be varied by means of the brake from zero to the maximum speed. The lowering of the load is controlled by the brake only. The speed of rotation is 5 complete turns per minute; traveling along the track the maximum speed is about 300 ft. per minute, or at a rate of about 3.5 miles per hour.

The Case Manufacturing Co. has recently built a number of locomotive cranes of various capacities, some being operated by steam engines and others by electric motors.

Mr. Acworth's Notes on American Railroads.

We continue from page 173 of our last week's issue the reprint of the very interesting notes on American railroads contributed by Mr. W. M. Acworth to the London Times. In his introduction to this, the third article, he says that the series is to be closed with a fourth, dealing with American railroads from the point of view of the British investor. We ought to have said before that Mr. Acworth has never told us that he is the author of these articles. Perhaps the editor of the Times would object to such a revelation of the inner workings of that great newspaper. We have connected Mr. Acworth's name with these articles from our own knowledge of his movements and his methods and on our own responsibility. It would indeed be a queer outcome if these articles should prove to have been written by, let us say, the editor of The Engineer.

Technical Education.

In my two previous articles I showed that the Americans have already displaced us from our hitherto undisputed primacy in railway speed, and I endeavored to trace a natural relation of cause and effect between the form of organization of the typical companies and the rapid progress of improvement. . . . In the present article my purpose is to give further illustration of the progress recently made in various directions. But before doing so I must say something of another factor which makes strongly for progress there, but is practically non-existent here—namely, technical education of different kinds. Young railway men here rise, when they do rise, by sheer force of character, and learn their profession by mother wit. Systematic instruction in the principles underlying their work is nowhere provided for.

In the United States, while there is, so far as I know, little or no attempt made to educate the subordinate staff, as is done in the railway schools of many Continental countries, ample provision is made for training of a higher class. At Harvard, at Yale, at Columbia, and Chicago—and I doubt not at many of the other Universities—leading economists like Hadley and Taussig lecture on railway questions in their economic and political aspect. The University of Chicago has actually a sub-professorship specially assigned to "Economics of Transportation." The technical departments of these same Universities, moreover, backed up by numerous technical colleges and institutes all over the country, lay themselves out to teach not only engineering in general, but railway engineering in particular.

If one wants to study the history and development of the English locomotive, the place to do so is not in England, but in the Field Columbian Museum at Chicago. . . . If one desires access to a railway library, one cannot find such a thing in London; nor, indeed, in England; but the Leland Stanford University in far California publishes the catalogue of its specialist railway library in a portly quarto. If an English traffic official desires to discuss with his fellows questions such as automatic signaling or improvements in handling goods in stations, he will find no society before which he can read his paper and no journal that would care to print it. We have, it is true, half a dozen journals with the word "railway" on their title-page. But there is not one of them that is a real railway technical paper, like the Railroad Gazette, which chronicles week by week for the American railway man the technical progress of his profession in the same manner as the English Lancet or Law Times does for the doctor or the lawyer. As for railway societies, we do not even profess to have them.

Passenger Accommodations.

At the same time I should be sorry to be understood as implying that our railways are in all respects inferior to those of America. The fact that we have not improved as fast as they have in the last few years is of course largely due to the fact that there was not here so much room for improvement. And apart from speed and punctuality, as to which I have already spoken at length, I think it is practically true, as was said to me by one of the foremost railway men in the States, that England has little to learn from America in the management of passenger traffic. American fares are unquestionably higher than ours. . . . As for accommodation, I doubt not that the ordinary Englishman would agree with me in saying—though I am well aware that the average American would disagree

with us—that an English compartment "sleeper" is more comfortable than a Pullman "sleeper," an English first-class compartment more comfortable than a Pullman parlor car, and an English third-class compartment more comfortable than an ordinary American—so-called first-class—day-car. . . .

Permanent Way.

Permanent way is so largely an engineer's question that it may be dismissed very briefly. But no one who has traveled on the great American lines can help laughing when he is told, as one often is here, that there is no first-class permanent way in the States. For my own part I think that traveling in America is smoother—it certainly is less noisy—than here. And that American roads, laid with flat-footed rails, can stand even heavier traffic than our chair-supported rails has been, I think, sufficiently proved by experience on the Pennsylvania Railway, where a trial length of standard London and North-Western line, laid and maintained by North-Western men, was knocked out of shape by a traffic which the standard Pennsylvania track survived uninjured. . . .

Suburban Service.

I have said America has not much to teach us in the conduct of passenger traffic. I should have expected Boston, the organization of whose suburban services is beyond all praise. The "Consolidated" trains are grouped in what are termed "schools." Every quarter of an hour a train leaves the terminus for a point some five miles off, calling at all stations, and then turning off down a branch. A few minutes later a second train starts, runs without stopping to the five-mile point, and then calls at all stations for the next five miles or so. A few minutes later again a third train starts, and, running unchecked to the ten-mile point, prolongs the service thence to the furthest station in the suburban area. At the next quarter of an hour a fresh "school" of trains repeats the tale. The same system is in force for the return journey. The luckless inhabitants of not a few of our London suburbs might be thankful if the railway management of the largest city in the world would condescend sometimes to take a lesson from the "schools" of the "hub of the universe."

Certain Railroad Statistics.

The tables which follow give certain facts about the railroads of the world collected by Mr. C. E. Prevey, a special student under Professor Hadley at Yale. The authorities and dates are given and we judge that many students will find the facts here tabulated useful.

TABLE I.—ANNUAL TRAIN MILEAGE PER 1,000 INHABITANTS.

	Year.	Tr. mi. per 1,000 pop.	Miles under control of State.	Private.
I.	U. S. 1895-6	11.931	189,891	189,891
	Gr. Britain . . . 1895	8.815	21,174	21,174
	Canada 1895	8.134	1,316	14,631
	France 1894	4.776	1,608	22,833
	Italy 1890	1.257	5,260	2,895
	Switz. 1894	4.860	2,220	2,220
	Hungary 1895	3.211	8,725	1,492
	Sweden 1895	1.262	1,851	3,603
II.	Holland 1894	4.040	1,936	.....
	India 1894	227	.....	.....
	State owns and operates	5,198	.....	.....
	State R. R. worked by companies. 8,605	.....	.....	.....
	Private roads	4,697	.....	.....
	(Statesman's Yr. Book.)	.....	.....	.....
III.	Germany 1895-6	4.378	25,205	3,082
	Belgium 1895	5.348	2,061	794
	Russia 1894	876	11,131	9,472
	Norway 1895-6	1.554	980	42
	Australia 1895-6	7.660	9,754	.....

(Statistics of population from the Statesman's Year Book, also statistics of railroad mileage in a few cases. Statistics of train mileage in this and the two following tables are from the Archiv für Eisenbahnwesen. Following are the citations to year and page: Great Britain, '97, 1,126; Germany, '97, 1,126; France, '96, 1,126; Italy, '94, 894; Switzerland, '97, 84; Sweden, '97, 502; Holland, '96, 417; Belgium, '97, 1,163; Russia, '97, 779; Norway, '97, 500; Hungary, '97, 945; India, '96, 779; Australia, '97, 1,184; Canada, '97, 523; U. S. Poor's Manual, '97, Austria, '97, 73.)

TABLE II.—ANNUAL TRAIN MILEAGE PER 1,000 INHABITANTS (Same dates as in Table I.)

	Passenger.*	Freight
United States	4,755	7,003
Great Britain	4,733	3,843
France	2,354	1,623
Germany	2,285	1,589
Switzerland (inc. mixed)	3,731	1,757
Belgium	3,054	2,145

TABLE III.—FREQUENCY OF TRAINS. Average number of train-miles per mile of road.

	Total.	Passenger.*	Freight
United States, 1896	4,762	1,867	2,750
Great Britain, 1895	16,005	8,700	7,103
Germany, 1896	8,097	4,244	2,913
France, 1893	7,618	3,756	2,580
Austria, 1895	5,219	(State roads only).	.....
Hungary, 1895	5,693	.....	.....
Switz., 1894, inc.	6,451	(4,911 inc. mixed).	1,510
Norway, 1895	2,905	.....	.....
Sweden, 1895	3,062	.....	.....
Russia, 1894	5,271	.....	.....
India, 1894	3,490	1,370	2,035
Australia, 1895-6	8,050	1,465	1,580
N. S. Wales	2,881	.....	.....
Victoria	1,993	.....	.....
Queensland	2,001	791	.....
S. Australia . . . . .	.....	.....	.....

TABLE IV.—DENSITY OF TRAFFIC. No. of ton-miles or passenger-miles per mile of line. (On ton = 2,000 lbs.)

	Passenger.	Freight.
United States	72,150	519,289
Great Britain	(No statistics)	.....
France	261,182	350,000
Germany	315,399	616,474
Switzerland	239,403	195,503
Sweden	76,462	150,932
Russia	189,600	703,689
Norway	91,532	68,959
Belgium	498,000	(State roads only.)
Australia	217,716	414,002
Hungary	143,000	348,700
India	315,085	232,090
N. S. Wales	41,200	.....

* No account is here made of the mileage of mixed trains because complete statistics are not to be had. The proportion of mixed trains is larger in Continental Europe than in England or the United States, as shown by the following figures taken for the same dates and from the same source as the above.

	Pass. train mileage.	Mixed train mileage.
United States	337,644,115	15,785,433
England	184,054,400	4,284,490
Germany	119,666,700	20,865,600
France	90,417,600	29,249,100

TABLE V.—AVERAGE TRAIN LOADS.

	Passenger-miles per train mile.*	Ton-miles per freight train-mile.
United States	35	180
Germany	72	190
France	69	130
Switzerland	48	(Mixed train mileage included.)
Belgium	66	142
India	224	.....
N. S. Wales	27	.....

TABLE VI.—RAILROAD TRAFFIC IN THE UNITED STATES.

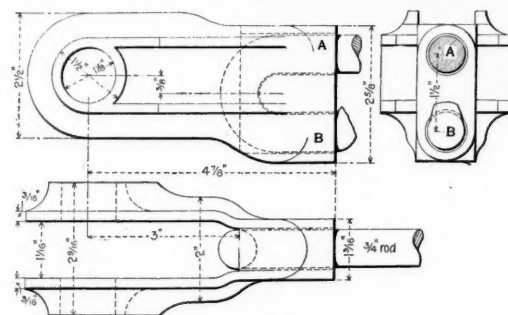
Group.	Pass. and Frt. Tr. Mi. per 1,000 Pop.	Pass. Tr. Mi. per Mi. of road.	Frt. Tr. Mi. per Mi. of road.	Pass. and Frt. Tr. Mi. per Mi. of rd.	Pass. Mi. per Mi. (in 1,000).	Ton Mi. per Mi.	Pass. train load.	Frt. train load.
1.	10,410	4.113	3,150	7,263	253	476	61	151
2.	15,041	4.101	6,690	10,790	170	1,410	41	216
3.	16,160	1,880	2,880	4,760	64	545	34	188
4.	7,180	1,220	1,700	2,920	39	330	32	193
5.	4,487	1,483	2,240	3,720	49	391	33	175
6.	8,911	1,150	1,770	2,920	34	263	29	138
7.	9,320	920	1,550	2,470	29	323	32	207
8.	9,740	1,130	1,430	2,560	62	269	55	187
Mass.	17,520	11,387	8,000	19,387	769.0	1,086	63	129

States in each group.	Density of population.
1. Me., N. H., Vt., Mass., R. I., Conn.	80
2. N. Y., N. J., Penn., Del., Md.	137
3. O. Mich., Ind., Ill., Wis.	65
4. Va., W. Va., N. C., S. C., Ga., Fla.	78
5. Ala., Miss., Tenn., Ken., La.	44
6. Mo., Ark., Tex., Kan., Col., N. Mex., Okla.	14
7. Ia., Minn., Neb., N. D., S. D., Wyo., Mont.	9
8. Wash., Ore., Cal., Nev., Ariz., Id., Utah.	4
Massachusetts	315

Railroad statistics from Poor's Manual, 1897. Population from World Almanac, 1897, p. 515.

Malleable Iron Jaw for Brake Rods.

Mr. B. Haskell, Superintendent of Motive Power of the Chicago & West Michigan Railway, has designed and is now using malleable iron jaws for certain parts of the brake rigging for freight cars, thus effecting a considerable saving in blacksmith work. The method of attaching the jaw and brake rod is



shown by the engraving. The end of the rod is first put through the cored hole A in the jaw, and is then heated in the forge and bent so that it can be drawn back through the opening B. The end of the rod is turned down to prevent the jaw from slipping on the rod. In this way brake rods can be fitted up quickly and no skilled labor is required.

City Purchase of English Tramways—Compensation.

An interesting point has recently arisen in connection with the movement in England in the municipalization of tramways. In several cases when municipal bodies have opened negotiations with tramway companies for the purchase of their lines, there has been raised the question of compensation for various officials whose services must be dispensed with.

Two cases of this sort just now in mind are Croyden and Liverpool. The Croyden Tramways Company entered into an agreement with the British Electric Traction Co., under which the latter company would take over the existing horse lines and equip them for electrical working on the overhead trolley system. It was intended to pay various sums amounting to about \$16,000 to certain officials—about \$10,000 to directors and \$2,500 to the secretary and other sums for other persons. A shareholder, who considered the charges exorbitant, applied to the High Courts for an injunction to restrain the company from carrying the agreement into effect, and the injunction has been granted.

In Liverpool, the corporation some months ago arranged to purchase the city horse tramways at a cost of about \$3,000,000, one section to be afterward experimentally equipped on the electrical power system at a cost of \$250,000. In the event of the electrical section proving successful the entire system will be similarly equipped. Now that the tramways have been taken over the corporation is recommended by its Tramways Committee to pay \$45,000 to the solicitors to the late Tramways Company, in respect of their claim for loss of net profits, amounting to \$4,710 per annum on the average of five years, and \$6,000 to the auditors of the late company calculated on the fees (\$500) received by them during the year 1896. The solicitors and auditors seem to be the only officials to be compensated according to the recommendation, and the proposal has not received the sanction of the corporation. The matter is to be referred to the Board of Trade, and if that body refuses to act, the

claimants will have to bring an action against the corporation.

We may add in regard to the Liverpool tramways equipment that a report has just been drawn up by the corporation electrical engineer outlining an important scheme for extending the electricity supply undertaking which now supplies the city with light, with the view to providing the current necessary for working and lighting the cars. A large new generating station is to be established on a site near the Leeds & Liverpool Canal, at a cost of about \$750,000. Liverpool will thus have a combined lighting and traction plant.

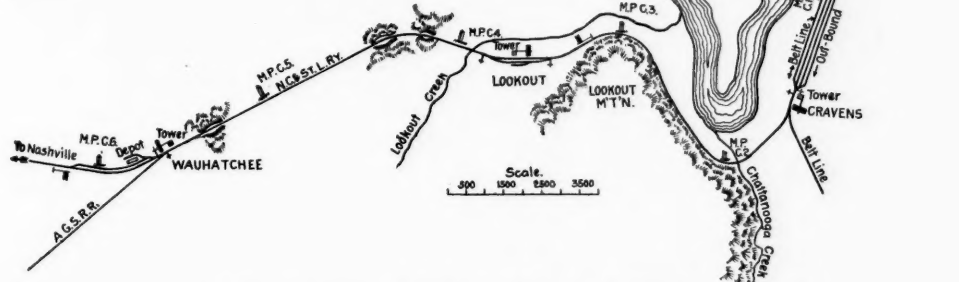
A Block Signal Record of Nine and One-Half Years.

The table which appears herewith is a summary record of the trains handled under the block system between Wauhatchie and Chattanooga, on the Nashville, Chattanooga & St. Louis Railway for 9½ years, the information having been furnished to us by Mr. Thomas, Assistant General Manager. A plan of the line is also given.

Trains Handled by Block System Between Chattanooga and Wauhatchie.

Period.	Total.	Single Track.		Double Track.	
		Ave. per day.	Highest No. any day.	Ave. per day.	Highest No. any day.
Year ending June 30, 1889.....	18,160	49.7	67	18,549	50.8
" " " " June 30, 1890.....	18,303	51.5	77	24,341	66.6
" " " " June 30, 1891.....	21,429	58.7	85	25,275	69.2
" " " " June 30, 1892.....	20,329	55.7	83	21,581	58.5
" " " " June 30, 1893.....	19,608	53.7	72	23,023	63.0
" " " " June 30, 1894.....	17,848	48.8	64	21,234	58.1
" " " " June 30, 1895.....	17,029	46.6	70	20,628	56.9
" " " " June 30, 1896.....	17,621	48.0	64	22,153	60.0
" " " " June 30, 1897.....	17,920	49.1	70	21,090	57.7
6 mos. " " Dec. 31, 1897.....	9,485	51.5	66	10,795	58.5
Total 9½ years.....	178,232	54.0	..	208,379	63.0
Average per year.....	18,761	..	..	21,934	..

From Wauhatchie to Cravens is single track for 4.4 miles. From Cravens to Chattanooga, 1.6 miles, there are three tracks, two north bound and one south bound. In the 9½ years there were 178,232 trains handled on the piece of single track. The greatest number of trains handled in any one day was 85, and the average trains per day for the whole period was 54, and Mr. Thomas informs us that the total cost for accidents up to the present time has been 65 cents, which is a pretty good record, not only for the block system, but for the track and the crews. The trains are governed by signals, no train orders having been issued, and no two trains, of which one is a passenger train, are allowed between Lookout and Cravens at the same time, and the system is worked absolutely in all blocks during thick weather.



Nashville, Chattanooga & St. Louis Railway, Wauhatchie to Chattanooga.

The despatchers are placed at Hooke street tower, Chattanooga, and instruct the operators which signals to display. They also handle the block signals at Hooke street and the starting signals at the Union passenger station and in the freight yard. The switches marked "X" on the plan are handled from the towers.

In addition to the trains of the Nashville, Chattanooga & St. Louis those of the Alabama Great Southern and the Memphis & Charleston use this piece of track.

Electric Distribution of Shop Power.

The general subject covered by the title of this paper has been much discussed in the technical press and in engineering societies, but most fully from the standpoint of relative economy in power consumed. I propose, therefore, to only touch upon this phase of the subject, confining attention to an elementary description of the different types of apparatus and comments upon their relative suitability for railway shop work, with hints as to character of the installation. . . . For useful data upon losses in factory power transmission, and upon the use of electric motors in shops, the reader is referred to papers by Profs. C. H. Benjamin and D. C. Jackson in the proceedings of the American Society of Mechanical Engineers, Vol. 18, for 1897; also to a paper on "Alternating Currents—Some Recent Advances,"

*Extracts from a paper by George Gibbs, read at the meeting of the New York Railroad Club, March 17. †For descriptions and discussion see the "Railroad Gazette," 1896, p. 33 (Crocker-Wheeler Shops); 1897, p. 76 (nut and bolt works); p. 112 (bicycle works); p. 233 (Baldwin Locomotive Works, and a discussion of relative cost); p. 273 (Tiffany Factory); p. 371 (Gibbs Turntable); p. 414 (Southern Pacific shops); p. 519 (Farrel Co.); p. 589 (Ramapo Shops); p. 721 (printing and folding machinery); p. 848 (a cotton mill).

by Mr. Chas. F. Scott, in the proceedings of the Engineers' Society of Western Pennsylvania, December, 1897.

Economy of Shafting Transmission.

The following data is largely taken from Prof. Benjamin's paper, with additions from my personal experience, which harmonizes therewith. The figures apply only to "heavy machine" work, such as found in railway shops.

The average friction horse power to drive belts and shafting, from engine pulley to machine pulley, in a number of shops was 52 per cent. of total power used. In a planing mill the friction horse power was 63 per cent. of total. This latter figure is somewhat less than I found to be the case in the planing mill of the C., M. & St. P. Ry. at Milwaukee, where 500 indicated horse power was used for average loaded mill, and 375 horse power, or 75 per cent., to drive the shafting, etc., with all machines idle.

Other figures given by Prof. Benjamin are: Friction horse power per 100 ft. of shafting, average 5.57; useful horse power per machine average, 0.45, with

considerable variation between extremes, running from 0.7 down to 0.16 horse power; useful horse power per man, average 0.38, varying from 0.88 to 0.14 horse power.

As the work done upon shop product is made up of energy expended upon it by the power-driven tools

and through the agency of the workmen, the relative costs of these will naturally vary largely; but in shops devoted to heavy machine work it has been ascertained that the power cost for tool driving is seldom more than 2 per cent. of the labor cost. It is thus seen what a relatively unimportant consideration and probable savings in power cost from improved transmission plants becomes in comparison with any probable savings in power cost from mentation of quantity in shop output. This leads us to the conclusion that we should first strive to arrange our transmission plant with reference to labor efficiency and convenience, rather than power efficiency.

Transmission Systems.

Power may be distributed by either of the two electrical methods: First, by "direct" or "continuous" current; second, by "alternating" current, or a reciprocating flow. . . . In the direct current system, the limit of workable pressure is soon reached, for the reason that the motor must receive the line pressure; very high pressures mean difficulty in maintaining insulation of the motor and danger to human life in attending to, or in coming into accidental contact with machines conveying it. The working limits for direct current transmission have been pretty well fixed at from 100 volts minimum to 500 volts maximum.

In the alternating current system we have a very beautiful means of generating electric power at as high pressure as we please, transmitting it efficiently in large quantities or for great distances at high pressure, then transforming it by a simple piece of apparatus without moving parts into low pressure power at the point we desire to use it. In fact, an alternating current line may have power tapped from it at various points at various different pressures, or

its pressure may be locally raised as well as lowered.

The transformers are made in various sizes, dependent upon the amount of power to be delivered from them, and can be used to supply an entire shop from one converter, or each motor may have its converter. They are generally placed either outside of the building, or in such places that the high tension wiring is entirely out of reach of accidental handling. When the distance from the generator to the motor plant is short, there is no occasion for high tension circuits and no converters are required, the generators furnishing current at the proper and safe pressure for the motors. Even in such a case, there is some advantage in the use of the alternating system instead of the direct, as will be seen when we come to speak of motor construction. In such a plant it may sometimes be of advantage to raise the pressure of a portion of the current after leaving the generator, sending it by a separate high pressure line to a distant shop, to be lowered there and used as before.

The beautiful flexibility of the alternating system is thus seen, and by laying out the system of power distribution it becomes an easy matter to figure beforehand the most economical system of pressure distribution in first investment and in current loss.

Suggestions Upon the Manner of Laying Out the System.

Having given a brief description of the apparatus comprising an electric power plant, I will now venture a few hints upon the selection of the proper apparatus for shop use.

The main point to be kept in mind is a desired increase in efficiency of the shop plant in turning out product with a reduction in the time and labor items, without especial reference to the fuel item involved in the power production; in other words, we should aim to facilitate quick handling of the materials of manufacture and give increased scope to the use of labor saving and portable tools.

The above objects involve a combination of group-driven tools, motor-driven handling machinery, and individual driving for isolated or portable tools.

Considering these in order: Group-driving should be adopted for small machine tools which are compactly arranged, and to the extent that further subdivision in driving would not result in improved operation of the tools or permit a more desirable method for handling material to and from them; handling machinery should be introduced to the fullest extent justifying the investment, as shown by labor savings, or by equivalent benefits in increasing the shop product; lastly, individual driving should be introduced as required by the above, or for isolated and intermittently running and portable tools, for which a large field is thus opened for the exercise of ingenuity of the mechanic. . . .

In nearly all shop electric installations, it is desirable to furnish current for motors and for lights from the same generator and circuits, thus avoiding additional apparatus and complication. . . . All things considered the proper voltage for shop power generators is 250 (corresponding to 220 at the motor), the reasons being that the brushes on both generator and motors work best at this voltage; the cost of the wiring system to distribute currents may be kept within reasonable limits; this pressure is not dangerous to life, or even disagreeable to handle, and is not too high for maintenance of insulation; either incandescent or arc lamps may be run between the circuits; and, lastly, it is very desirable to lend assistance in establishing some standard pressure which may be generally adopted, and 250 volts appears to best meet all of the conditions of present practice.

Type and Size of Generator.

It is difficult to make general recommendations upon this heading, since local conditions will greatly modify suggestions made to fit a particular case.

This much may be said: The best type of generator for combined light and power purposes is the multipolar with compound winding on its fields, and with an iron-clad armature having its winding imbedded below its surface and held in place by wedges—not band-wires. If of direct current type, it should have carbon brushes bearing upon commutator, and these should require no shifting in position with change of load from no load to 50 per cent. overload.

These machines are usually made to run by belted attachment when in sizes below 100 H. P., and may be so run in larger sizes, say up to 300 H. P. When belted in sizes of 100 H. P. or more, it is very desirable to provide an out-board bearing at the pulley end, so that excessive wear and heating of bearing may be prevented. The 100 H. P. unit may, however, be roughly taken as the dividing line between a belted and a direct connected rig, all machines above this size being made for direct attachment to the engine shaft.

The advantages of a direct connected rig are: Compactness, positive driving action, absence of excessive bearing friction due to belt pull, lower speed and somewhat more solid construction (in small machines) due to greater size of parts.

The advantages of belted rigs are: Cheapness due higher speed, which means more output for same weight of material, ready applicability to existing engine plants, provided space is sufficient; ease of repair, the dynamos being separate from the engine; and perfect insulation.

In planning the installation of a transmission plant with small beginnings, for running, say, one electric traveling crane, transfer table, turntable outfit, and a few portable tools, a 75 or 100 H. P. belted generator will be found a convenient unit size. It may be installed cheaply by belting from the countershaft at the main shop-engine, but it is altogether better to provide a separate engine for the reasons that the electric drive may be needed 24 hours in the day for special work (such as round-house turntable); and it makes a good emergency power plant for portions of the shops working overtime, by belting a portable motor to a section of the line shaft, or to a large single tool—such as a wheel lathe. It may be also used at nights to light the roundhouse and other buildings. When the transmission plant outgrows the capacity of this generator, it may still be used as a "spare," or for overtime work.

In laying out a complete system of electric transmission, careful attention should, of course, be given to selection of unit sizes; little advice can be given off-hand for such a case. In large plants, say, of 400 or 500 H. P., there should be two and possibly three units of the direct connected type and selected so that the engines shall run as far as possible at economical loads, and that one unit may be thrown out of service for emergency repairs. I do not mean that of necessity a spare unit shall be provided; this is desirable but not essential, as it is seldom that emergency repairs cannot be made overnight, and regular repairs between Saturday and Monday morning; and with electric driving having divided distribution, it is generally easy to shut down certain portions of a shop when necessary to temporarily reduce the generator load for repairs, without serious inconvenience for a few hours. This is one of the advantages of group or individual driving over the line shafting method.

Generators are sold with a guarantee to deliver their rated capacity, when driven at a certain speed, indefinitely, with a maximum temperature rise, due to electrical losses, of an amount supposed not to be injurious to insulation; this rise should not exceed 40 deg. Centigrade above the temperature of the surrounding air. They are also guaranteed to carry an overload of 25 to 50 per cent. for two hours, and short-period overloads of 100 per cent. without injurious heating. These guarantees have led to an objectionable but common practice of figuring the engine size on the overload capacities; that is, it is quite customary to couple a generator to an engine having its economical rated capacity equal to the 50 per cent. overload capacity of the generator. The consequence is that load is piled on the generator as long as the engines will pull it without seriously dropping off in speed, and an expensive generator is finally ruined for lack of the common sense precaution which would be furnished by a properly adjusted engine unit.

The efficiency of a modern dynamo is excellent over a wide range of loading; machines of 100 H. P. and upward will put out in the shape of useful current at their terminals 92 to 93 per cent. of the power supplied at the armature shaft; at partial loading the efficiency will fall off slightly, being about 90 per cent. at half and 86 per cent. at one-quarter load.

Motors, Direct Current System.

For belted connection to either line shafting or individual tools, the constant speed shunt motor is the best. This should be of the multipolar type, and is preferably of "open" construction; that is with the commutator and ends of field frame exposed. It is very desirable to have the brushes and connections in view and readily adjustable, and the whole machine accessible for cleaning from oil and dirt; second, the open type is better ventilated and runs much cooler than the enclosed, which means economy in first cost and repairs.

For traveling cranes, hoists, transfer tables, locomotive turntables, and boiler shop plate rolls, a different type of motor is best; starting under load, variable speed running, stopping and reversing is the cycle of operations for such purposes. The series-wound motor is therefore used; and is preferably of the enclosed style, which allows of more universal connection in any position, by gearing or otherwise, than the open type—the question of heating being not so serious on account of intermittent running. When geared, this motor should, if possible, have its frame flexibly mounted to reduce the shock of starting.

Selection of Motors.

In installing a motor plant it is of importance to keep down the number of different sizes and types. . . . Competition among the makers of cheaper grades of motors has resulted in giving ratings dangerously close to the maximum safe working limit, and a reduction in the working load greatly increases the durability of the machine. The effect

of variation of load upon the efficiency of standard motors is shown in Table No. 1; the efficiency will be seen to fall off quite seriously at $\frac{1}{4}$ load on the smaller sizes, but the actual amount of power so wasted is not very serious after all.

In deciding upon the make of motor to be

Table No. 1—Efficiencies of Multipolar Motors.

Horse Power Rating.	Efficiency Per Cent. at		
	Quarter load.	Half load.	Full load.
1	40	58	70
2	47	68	78
3½	57	70	79
5	60	73	83
7½	65	78	85
10	70	81	86
15	70	81	87
20	73	82	88
30	76	84	90
50	76	85	91

purchased, there is the same range for selection as found in other lines of machinery; but as an electric motor is a somewhat delicate machine and liable to diseases of a mysterious nature and of difficult diagnosis by the layman, it is of great importance to select a healthy specimen. Such a one can be had of several reliable manufacturers, but is not the lowest in first cost, and, in absence of definite information, it is generally safest to avoid a very cheap machine. Even the best manufacturers make motors with different ratings as to speed and heating limits, and my advice is to select the motor with lowest speed and lowest heating limit; this latter should not exceed 40 deg. C. rise above external temperature, at continuous full load run. The speed should be the so-called "slow-speed" variety; Table No. 2 gives about the proper speed for each of the standard sizes of shunt motors. This table also gives the approximate selling prices of the list, based upon the highest grade machines. Price includes motor, with pulley, base-frame and belt tightener, also automatic starting box. . . .

Alternating Current Motors.

In the paragraphs devoted to a description of alternating apparatus, I have called attention to the su-

Table No. 2—Speed and Prices of Slow-Speed Multipolar Motors.

Rated Output H. P.	Speed R. P. M.	Price per H. P.	
		Price.	Price.
1	1,300	\$88	88
2	1,200	135	67
3½	1,050	190	55
5	950	240	48
7½	850	310	41
10	750	400	40
15	650	500	33
20	600	600	30
30	575	875	29
40	575	1,040	26
50	550	1,200	24

perior features of the induction type of 3-phase motor, and would recommend the selection of this type for an alternating distribution plant.

As this motor has no electrical connections from the lines to the armature, it may properly be of the enclosed style, with provision for ventilation. The working pressure should be 220 volts, and the current of 7,200 alternations.

These motors have somewhat higher speed than the direct type and are somewhat higher in price, but their adaptability to railroad shop use is unquestionable, and they are quite certain to come into extensive use.

Electric Distribution at the Baldwin Locomotive Works.*

As an example of the practical character of electric distribution of shop power, I am permitted to refer to the plant at the Baldwin Locomotive Works. The progressive spirit of the owners of these works is nowhere better exemplified than in the manner in which they have reconstructed their extensive plant during the past few years to take advantage of the most modern methods in handling material and utilize to the utmost the earning capacity of tools within re-

therefor except at incomparably greater expense in installation and maintenance.

In making this statement, I am well aware that handling machinery, such as traveling cranes, can be and are often operated by other means than electricity; but their practicability hinges upon the provision of overhead spaces free from obstruction of line shafting, belting and supporting columns; the machine tools underneath must, therefore, be driven by line shafting and belting below the floor, which is a clumsy and generally impracticable method, or else by individual electric motor driving. In the Baldwin Works, many of the most beautiful examples of traveling crane economy are found in the heavy tool shops—the wheel and the frame shops, for example—where motor-driven tools have cleared the spaces for the cranes to work in. It is not, therefore, too much to say that electricity has been the key to the situation in these shops.

Electric power was first introduced in 1890, when the new erecting shop was built, and was installed especially for the purpose of driving two 100-ton capacity cranes; these are of 75-ft. span and cover, in two aisles, the entire area of the shop, 150 x 350 ft. They are each run by a 50 H. P. motor, belted to the driving clutches. An immediate saving of eighty men in the laboring force was effected, due to increased facilities afforded by these cranes. The possibility of this result will be seen when we consider that one of these cranes is capable of lifting an entire locomotive, as well as the component parts of the same, thus allowing the various operations of erection to be carried on without mutual interference in the least possible space, and avoiding entirely the immense manual labor connected with the lifting of heavy parts, and delays consequent thereto.

A number of portable electric drilling outfits were also introduced in this shop, with a corresponding reduction in hand drilling work.

The next step taken was the remodeling of the wheel shop. This had been driven by the ordinary method of line shafting and work handled at the lathes, etc., by hand jib cranes. This necessitated a heavy roof and precluded the effective use of overhead lighting, on account of the mass of timbers, shafting, pulleys, belting, etc. The shop was, consequently, very dark and much space was wasted in two long main aisles the entire length of shop, for handling the work in and out of machines. The laboring force amounted to about forty men, and it required six men and 30 to 40 minutes time to unload and reload the large wheel lathes.

In the new shop, occupying the same area, electricity was used for driving each machine having its individual motor; a traveling crane was erected, spanning the entire floor; about one-third more machines were installed, and skylights were introduced in the roof trusses, thus making the shop one of the lightest and most cheerful possible.

The handling by crane permitted a reduction in laboring force to about one-tenth of that previously required—from forty down to four or six men; two men suffice to operate the crane, one at the levers and one at the hook. Moreover, a machine can now be unloaded and reloaded in five minutes with ease, largely economizing the time of the workman and increasing the capacity of the tool. A considerable reduction in power requirements has also followed the introduction of electricity in this one shop; the shafting method required 150 H. P. at the engine, whereas there is seldom registered now more than 80 H. P. at the switchboard, notwithstanding the addition of the crane and many more machines.

Similar results have followed the introduction of electric driving in their frame shops, which constitutes really an extraordinary example of the ingenious application of elastic distribution for bulky material to be handled and worked in restricted space with very low headroom. By application of individual motors to the tools, the headroom was cleared for three short, spare, compactly built traveling cranes, which operate successfully in a vertical space thought entirely insufficient until seen. The shop has thus been converted into a handily arranged and light one, and the laboring force reduced 50 per cent. over old practice.

In the new boiler shop electric driving has effected similar economies in time, space and cost; all tools are here driven by individual motors, and all plate and boiler handling done by electric cranes. The same remarks apply to the new tank shop; this shop is located nearly half a mile from the power house, which would have necessitated a separate boiler and engine plant had steam driving been used.

Let the foregoing may be cited as illustrating the benefits of the use of traveling cranes, and not of electric power transmission, I may say that in every case, except that of the erecting shop, the use of the crane was made possible only by electric driving of the tools served by it; and, more-

Table No. 3—Power Required for Machine Tools—Baldwin Locomotive Works.

Tool.	Kind of work.	Cut.	H. P. required.			No. of cutters.
			Empty.	Light load.	Full load.	
70-in. wheel lathe.	Wheel center.	Light.	..	4.7	7.9	2
	32 in. wheel center.	$\frac{1}{2}$ in. deep.	..	4.4	5.8	2
	56-in. wheel center.	..	1.5	5.2	6.2	2
	56-in. wheel center.	$\frac{1}{2}$ in. deep.	..	4.3	7.1	1
Horizontal lathe.	Frames.	Heavy.	2.3	5.0	10.3	1
	Two frames.	$\frac{1}{2}$ in. deep.	11	..	21.6	2
	Wrought iron 6 in. thick.	..	1.5	2.1	6.5	1
	Frames.	..	3.4	4.2	7.4	1
Slotter 18 in. stroke.	Frames.	..	3.4	..	11.3	2
	Large double frame planer.	..	..	1.94	2.9	1
	Slotter 12 in. stroke.	..	..	1.92	2.2	1
	Wrought iron 6 in. thick.	..	..	1.94	2.85	1
36 in. planer.	1-in. drill wrought iron.	..	..	..	..	..
	1½ in. drill.	..	..	..	..	..
	2½ in. drill.	..	..	..	..	..
	¾ in. plate steel.	..	3.5	6.	19	1
Drill press.	Steel plate ½ in. thick x 10 ft. 6 in. long in shears.	..	4.5	14.4	19.8	..

stricted areas. So admirably have the details of their equipment been worked out that the limitations of handling the heaviest and most bulky of shop product in areas available in the heart of a large city, are hardly felt. It is not too much to say that their manufacturing methods to-day hinge largely upon changes made possible by the use of electric power, and that no other agency could be substituted wholly

*Described in the Railroad Gazette, 1877, p. 233; but Mr. Gibbs' description has a value of its own because it is affected by his personal opinions and experience—Editor.

over, in no case, except that of this same shop, is it possible to drive the cranes themselves by any other method.

The works have now installed 215 motors rated from 2 to 50 H. P. each, and averaging 9 H. P. each for the entire number. The aggregate H. P. in motors is, therefore, 1,930.

The total generator capacity installed is 700 H. P., and the daily average H. P. at the switchboard is about 570, which is fairly constant throughout the day.

Table No. 3 is appended, giving a partial list of the kinds of machines operated by individual motors, with the amounts of electric power supplied the motors under different conditions of operation.

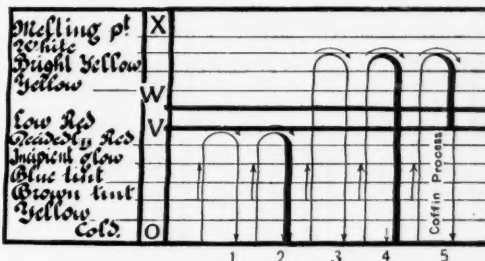
Repairs.—The force of workmen needed to keep up all line repairs, inspecting and repairs on the 215 motors, and on ten arc dynamos and four generators, consists of two men, with one-third of the time of another. One of these men alone keeps up repairs on armatures. The labor cost will thus average \$6 per day, and the new material consumed in repairs is estimated to cost about \$2 per day. The total labor and material cost per year is therefore about \$2,500, or about 4 per cent. on the first cost of the plant. Expressed in another way, it has been estimated roughly that the reduction in amount paid out for new belting and belting repairs since the introduction of electric driving, is sufficient to pay for maintenance of the motors.

Manner of Connecting Motors.—A word may be said regarding the practice at these works. Group-driving is employed for small tools, by belting from a motor to a line shaft. Individual driving is used for large and for isolated tools, or where cranes make shaft-driving inconvenient. The attachment method in latter cases is somewhat peculiar and may

but also, and to a much greater extent, upon the treatment it receives; that is to say, a steel of inferior chemical composition may, by proper treatment, become ultimately of better quality than a steel of very excellent chemical composition, but which has been improperly treated or mechanically abused. Temperature being greatly responsible for the difficulty described, an investigation into the manner that temperature acts, to produce such undesirable results, leads us ultimately to a method of "cure," and at the same time enables us to impart other valuable and desirable properties.

Carbon exists in steel in two principal states, hardening and non-hardening. Hardening carbon is that form of carbon found in steel which is produced by first being heated to a high red heat and completely and quickly cooled by quenching in water. Non-

distinguished as dark cherry red (temperature V) however quickly it is cooled; on the contrary, it will become sensibly softer and more easily worked with a file. When the temperature in rising has reached "W," the substance of the steel quickly passes from the granular or crystalline condition to the amorphous, or wax like structure which it retains up to its melting point (temperature "X"). The points, "V, W, X," have no permanent place in the scale of temperature, but their position varies with the quality of steel.



Fine lines indicate slowly heated and slowly cooled; heavy lines indicate slowly heated and quickly cooled.

In the Coffin process advantage has been taken of the various conditions described and after forging, the axles are cooled completely, so that the carbon will be in the non-hardening state; they are then heated until the temperature is reached at which the carbon changes to its hardening state; the time of so heating them being a little over an hour. The result of this change of carbon is to break up the crystallization completely and put the whole mass of steel in an amorphous state. They are then cooled as rapidly as possible to a temperature somewhat below "V" and subsequent cooling is done in the open air. The apparatus consists of a furnace which will hold about 12 axles, with a charging door on one side and a drawing door on the other; in front of the furnace is a long bosh filled with water and provided with a submerged jet pipe, over which is suspended a cradle provided with driven friction wheels; the axle is rolled out of the furnace on these wheels, the friction of the wheel setting the axle in rapid rotation. The cradle is then lowered below the surface of the water, while at the same time a valve is automatically opened in the water supply pipe to allow the powerful submerged jets to play upon the revolving axle. In a few seconds the cradle is raised carrying with it the revolving axle above the surface of the water. The axle is then deposited on the cooling bed. There is still enough heat remaining in the interior to bring its whole mass to a dark red heat in the dusk.

As the axles are delivered on the cooling bed most of the carbon is in the hardening state, for though the temperature is low enough, there has not been time enough for a change. Up to the point where the toughening process begins our methods are similar to other makers of open hearth axles, or, in other words, the Coffin process begins where the other makers leave off.

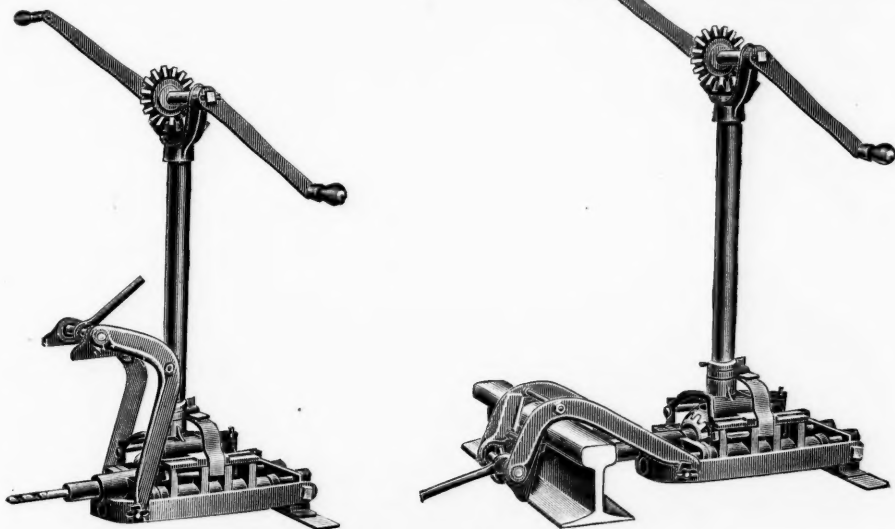
What is gained by the Coffin Toughening Process: 1st. All the irregularities of forging are relieved and the steel brought from an irregular and coarse crystalline to an amorphous state.

2d. The elastic limit of the steel is greatly increased without loss of elongation or ductility as shown by the following test:

An axle was cut in two, one-half of it alone being toughened. A tensile test four inches between fillets and one-half inch in diameter, was cut from each half giving the following results:

	Elastic Limit, Lbs.	Ultimate Strength, Lbs.	Elongation, Per cent.	Reduction, Per cent.
Untoughened	30,000	71,520	24.50	51.50
Toughened	44,000	72,020	24.07	57.20

The tests are remarkable as showing the same properties throughout except elastic limit; the



Q & C Rail Drill for Street Railroads.

at first sight strike one as a makeshift; a knowledge of electric machinery will, however, convince an observer that there is good, practical, mechanical sense in it. It consists in supporting the motor upon a light iron framework bolted to the machine, this same framework serving as support for the conepulley countershaft. The motor is then belted to the countershaft, and the latter to the machine, as usual. This arrangement allows of variable speed with belted connection to the motor, without electrical complications of variable speed motors, and an elastic connection between the motor and the cutting tool.

Details are, of course, modified in carrying out the scheme, but in general the method consists in belted rather than geared motor attachment.

Reliability.—Two facts will be sufficient testimony that in this important quality electric distribution of shop power is satisfactory; they are: 1st, the small repair account above cited, and 2d, the fact that the electric plant in these works is being constantly extended.

The Q & C Rail Drill.

The illustrations show the Q & C self-feeding rail drill, especially designed for street railway work, the drill being made quite narrow so as to necessitate the removal of as small an amount of paving as possible when in use. The drill is secured to the rail by an overhanging clamp and is adjusted by means of an eccentric, which enables the clamp to be removed quickly to permit of the passing of cars; the main upright of the drill fits into a socket, and can also be readily removed when cars pass. The weight of this drill is 65 lbs., and is made by the Q & C Company, Chicago, under patents obtained from the inventor, Mr. M. M. Moore. This style of drill is described in a new catalogue just issued by the makers, as is also a drill used extensively by steam railroads, wherein the clamp passes underneath the rail.

The Coffin Toughening Process.*

The Coffin toughening process is as legitimate a process as that of chilling the tread of a cast iron car wheel, or the tempering of a spring. It is not a steel process per se, but rather a form of manipulation, subsequent to and entirely independent of the process of steel making. It is rather a mean between annealing and tempering, producing a structure somewhat harder than by annealing, and yet not quite as hard as by tempering.

Whereas, annealing supplies the desirable cure for the flanged throat sheet, it comes short of producing the ideal conditions for a forging. To be sure the forging strains can be relieved, but the material is sensibly softer, and lacking in the requisite stiffness. On the other hand, tempering has a tendency to produce a structure which is hard and brittle. As a general proposition the strength and quality of steel depends not only upon its chemical composition,

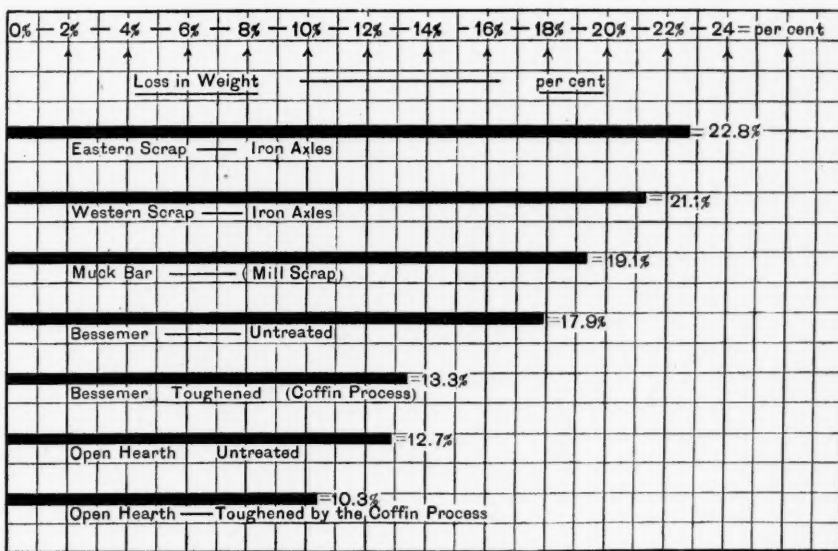
hardening carbon is that form of carbon found in steel which has been heated to a red heat and slowly cooled.

If steel is heated to a certain temperature, "W," nearly all its carbon changes to hardening carbon, and the change is quite sudden. If steel is cooled slowly from temperature "W" the carbon remains in the hardening state until a somewhat lower temperature, "V," is reached, when it begins to change to non-hardening carbon. This change is somewhat slow, so that if the steel be suddenly cooled in water there is not time for the change to take place; and the result is hardened steel.

There is a certain chemical force in the change of carbon which causes a breaking up of the crystals, when the change is from non-hardening to hardening.

Again, if steel is heated to a dull red heat below "W," or, say "V," the carbon is not affected by either rapid or slow cooling.

If a small bar of axle steel is heated to temperature "W" and cooled rapidly as possible in water to temperature "V" and then allowed to cool slowly until cold, it will give a perfectly amorphous fracture—no crystal nor crystal form will be visible under the most powerful glass. It will be very tough and ductile, and a very marked increase in the elastic limit



Comparative Wear of Axle Metal—Percentage of Loss.

From eight days' run; 200,000 revs.; Richlé Abrasion Testing Machine.

(between 40 per cent. and 50 per cent.) will be the result, without appreciable change in the ultimate strength. This result, that is, degree of result, is not entirely attainable in an axle because it is impossible to cool it as rapidly as a small bar, but it can be approached very nearly, and illustrates the principle involved.

Chernoff in his experiments on steel proves that steel, however hard it may be, will not harden if heated to a temperature lower than what may be

toughened piece being 46.6 per cent. higher than the other in this respect.

The reason for paying particular attention to the elastic limit is quite plain. The variation of stresses and the force exerted by the violent blows and shocks to which car axles are subjected are somewhat uncertain quantities. Hence we must have a safe margin for such uncertainties.

The best grade of steel for a car axle is one which

(Continued on page 202.)

*From a paper presented by Mr. L. R. Pomeroy, of the Cambria Iron Company, at the February meeting of the Western Railway Club.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The compilation of railroad gross earnings for the month of February as made by the "Chronicle," shows an increase over the same month last year of almost five million dollars, or nearly 14 per cent. Out of the 131 roads reported only 20 showed decrease. This increase is compared with a decrease of \$320,000 by 130 roads in February of 1897. The Northern Pacific leads with almost \$500,000 increase, and the Illinois Central comes close behind; then the Rock Island, the St. Paul, the Missouri Pacific, the Great Northern and the Oregon Railroad & Navigation all have about a quarter of a million increase, more or less, and the Canadian Pacific has \$216,000. The month was a particularly good one in several ways. The grain movement and cotton movement were heavy and the weather was favorable.

Nickel Steel for Staybolts.

We have lately called attention to the growing demand for nickel steel for locomotive crank pins, piston rods and driving axles, and in the discussion on nickel steel at the February meeting of the Western Railway Club several expressed themselves as favoring the use of this material for such parts.

The ability of nickel steel to withstand alternating stresses has naturally suggested that the staybolts of locomotive fireboxes might with advantage be made of nickel steel, as not only are staybolts subjected to alternating stresses, but broken staybolts are not easily detected and very likely the number of locomotive boiler failures occurring from broken staybolts is greater than that from all other causes combined. In the matter of staybolt material it is conceded that saving in first cost is poor economy, so that if nickel steel should be found to give better service than the materials now commonly used, its increased first cost would not seriously stand in the way of its rapid adoption.

A Western road, which was among the first to investigate this phase of the question, has sent us some results of laboratory tests made with nickel steel furnished to the road by a large maker as suitable material for staybolts. The chemical analysis of this steel is as follows:

Carbon .....	.14 per cent.
Phosphorus .....	.012 per cent.
Manganese .....	.94 per cent.
Sulphur .....	.021 per cent.
Nickel	3.7 per cent.

The physical characteristics are:

Elastic limit.....	61,900 lbs. per square inch
Ultimate tensile strength.....	86,930 lbs. per square inch
Elongation in 8 in.....	19.2 per cent.
Reduction in area.....	54.8 per cent.

Three staybolts were made from this steel for test, with straight shanks turned down to $\frac{13}{16}$ in. in diameter with a $\frac{1}{8}$ -in. hole, $\frac{1}{8}$ in. deep, drilled in the end which screwed into the fixed plate of the vibratory testing machine. This machine was so arranged as to maintain a constant load of 1,000 lbs. along the longitudinal axis of the bolt tested, while the free end of the bolt made 500 vibrations per minute, each of $\frac{1}{8}$ in. amplitude.

The first of these test specimens withstood 292,420 and the second 219,220 vibrations before breaking, while the third specimen broke within the fixed plate after 362,220 revolutions. The average of the first two tests is 255,820, which is stated to be about three times the number of vibrations which the best material now commonly used for staybolts has been found to withstand when tested on the same machine and under the same conditions. This road has now had a locomotive firebox in service about four months fitted with nickel steel staybolts of the same material as tested in the laboratory, but as the poorest kind of staybolt material ought not to develop any weakness or failure within a year, it will be some time before the results from the service tests will be available.

Other roads are experimenting with nickel steel staybolts, and this is a good time for the consideration of certain features of this question. Those who have to do with the repairs and maintenance of locomotives would like exact information, which is not generally available. For instance, how is the life of nickel steel affected by expansion and contraction due to such variations in temperature as may take place in locomotive fireboxes, and does this material lend itself to the severe shop treatment to which staybolts are often subjected? Also, are the results of vibratory tests of staybolts, as conducted in the laboratory, an index to what may be expected from the same material in service?

We know of no data which throw any light on the first and second questions, while the third question is a disputed one, the makers of staybolt material which will not pass the vibratory test claiming that such information is of no value and bears no relation to the results to be got in service. On the other hand, those makers whose product seems to be particularly suited for such tests claim that this is the only means of obtaining accurate comparative data regarding different materials for staybolts.

Has the Supreme Court Pronounced the Nebraska Law Unconstitutional?

If it be true that Freedom shrieked when Kosciuszko fell, certainly Justice, unless she is dumb as well as blind, ought to have made a mild demonstration of some kind when her ministers of the United States Supreme Court handed down their decision in the Nebraska case. All the comments upon this decision that we have seen agree in the announcement that the Court decided the Nebraska Act of 1893 to be unconstitutional and void, and while that may indeed be the effect, we seriously doubt whether Justice Harlan, when he laid aside his pen at the close of his opinion, realized such to be the exact result of the judgment of the Court whose opinion he delivered.

The main principle announced in the case is not a new one. As far back as 1886, in the celebrated Railroad Commission cases, which came up under an act of Mississippi passed in 1884, creating a railroad commission and charging it with the duty of revising the tariff of charges and generally supervising railroads, the Court, in upholding the authority of the Legislature to pass such an act, recognized the proposition that under such a statute the fixing of unreasonable rates would be in derogation of the Constitution, though there was nothing in the act in question to warrant the inference of such an intention. In 1890 the Minnesota Act of 1887, establishing a railroad and warehouse commission and providing that there should be no judicial inquiry as to the reasonableness of rates, which the commission determined to be reasonable, was declared to be in conflict with the Constitution of the United States as depriving the railroads of their property without due process of law. In 1892 the Michigan act came up for review, and it was held that upon its face it violated no provision in the Constitution, as the Legislature has power to fix rates for the transportation of passengers and the extent of judicial interference is limited to protection against unreasonable rates. The Texas law of 1891, establishing a railroad commission with power to classify and regulate rates, was before the Court in 1894, and while it was not deemed necessary to pass upon the validity of the law, the Court did take occasion, very clearly, to lay down the doctrine that it was within the power of a Court of Equity to decree, after a full and fair investigation, that the rates established by the commission are unreasonable and unjust, and to restrain their enforcement. In 1895 the same principle was very clearly marked out by Justice Shiras in the case of the St. Louis & San Francisco Railroad Company, while in 1896, following the trend of its previous decisions, the Court did not hesitate to pronounce as void the Kentucky

act of 1890, reducing the tolls of a turn-pike company to an unreasonable extent. Last year, in the interesting contest between the Interstate Commerce Commission and the railroads, over the question whether the Interstate Commerce law authorized the intervention of the Federal Courts at the instance of the Commission to fix rates, the Supreme Court did not in any respect recede from its previous decisions on this subject, but cited them with entire approval.

So that in pronouncing the Nebraska act unconstitutional, if it has done so, the Court has simply meant to say that the Legislature of that State has ample power to fix rates that are reasonable and just, but cannot go one step beyond this.

It is not to be understood, however, that the Federal Courts arrogate to themselves the privilege of fixing rates or determining what shall in the future be considered as reasonable and just. On the contrary, this is precisely what they have repeatedly disclaimed any power to do. With them the sole question is whether rates, that have already been fixed, either directly by the Legislature itself or indirectly, through a commission, are in any given case reasonable and just, or not. In determining this question they decline to say, for example, that a law which fixes a tariff of two cents a mile for a passenger, or five cents, is, on its face and in the absence of evidence in the special case, invalid. There is nothing upon the face of such a law to show that either of such rates is unreasonably low or unreasonably high with reference to the peculiar circumstances of the individual railroad affected. The Court invites a thorough investigation into all the circumstances, and pronounces its judgment upon the facts of each particular case.

We are not, therefore, to conclude from the decision in the Nebraska case, that the Court will hold to-morrow or at any future time, that an act, prescribing the rates that were prescribed in that act as maximum rates to be charged in that State, is illegal and of no effect. We have no doubt that if the Court were called upon simply to say whether the act as it stood in 1893, without any evidence to show that the rates fixed by it were unreasonable and unjust, the Court would have held that there was nothing on the face of the act to show unreasonableness of rates, and as its validity is to be presumed until the contrary appears, the law should be held valid, without prejudice, however, to a re-examination upon evidence on the question of reasonableness.

But the Court in the Nebraska case has pronounced its judgment upon the evidence, on the question of reasonableness, and has come, after due deliberation, to the conclusion that under the circumstances, commercial and economic, existing in Nebraska at the time of the passage of this act, the rates therein prescribed were unreasonable and unjust and that therefore the act was unenforceable. Did the Court hold that it was therefore unconstitutional and void from the beginning to the end?

If the Court has so held, the concluding paragraph in its opinion is an anomaly in court opinions. If it does not so hold, its decision is an anomaly in constitutional law.

The dwellers in the land of Shinar said one to another: "Go to, let us build us a city and a tower whose top may reach unto Heaven and let us make us a name lest we be scattered abroad upon the face of the whole earth." But the Lord said: "Go to, let us go down and there confound their language that they may not understand one another's speech." This simple contrivance was unforeseen by the builders of Babel, but had nevertheless a powerful effect upon their scheme.

The lawmakers of Nebraska in 1893 deliberately proposed an act which should fix maximum rates to be charged by the railroads within the State, and, pronouncing them to be reasonable by the legislative fiat, whether they were so or not in fact, forbade any one to question the justice of these proceedings. But beyond and above the lawmakers was a grim, resourceful power that has taken note of their finished work and brought it to nothing. This Nebraska act was a most elaborate performance. The scheme consumed in its statement nearly 200 pages of that year's volume of Nebraska laws. It determined the charges to be made upon quite every conceivable kind of freight without any apparent reference to whether such charges could be made at a loss or not. The Legislature seemed to be so proud of its work that it thundered forth even the name by which this splendid scheme should hereafter be known to all posterity. The act itself provided that it should be called "The Nebraska Classification." The reasonable maximum rates were to be known as "The Nebraska Schedule of Reasonable Rates." It

was a veritable tower of rates that was to reach unto heaven. The violation of the act was attended with damages, including costs and counsel fees to private individuals and penalties in the shape of fines to the state, reaching as high as \$25,000 for every offence after the third. The enforcement of the act was left to the State Board of Transportation, which was the defendant in the case brought in the Federal Court to enjoin that enforcement.

Looking upon the face of this act alone, and without reference to the circumstances of the railroads affected, it is quite impossible for any one to say that the rates prescribed were, in themselves, unreasonable and unjust. If, for example, the expense of maintenance were not so and so, or if the volume of business was peculiarly large and profitably handled, or if all the roads were so identically situated that their business was all equally profitable, it is quite possible that the rates would have been reasonable and just. Whether these facts existed or not, the Court is not supposed to know, and as a matter of fact, cannot know until the question is brought before it by evidence; hence it is quite impossible to say, without evidence, that the rates were unreasonable, and as the Legislature is presumed never to work an intentional wrong upon its citizens, every doubt as to its good faith must, in the absence of evidence, be resolved in its favor and its laws be upheld by the Court.

The Circuit Court had provided in its final decree that the Board of Transportation might, "when the circumstances have changed so that the rates fixed in said act of 1893 shall yield to the said companies reasonable compensation for the services aforesaid, apply to the Court by bill or otherwise, as they might be advised, for a further order in that behalf." Justice Harlan proceeds: "The conditions of business so far as railroad corporations are concerned, have probably changed for the better and the rates prescribed by the statute of 1893 may now [March, 1898] afford all the compensation to which the railroad companies in Nebraska are entitled as between them and the public. In anticipation perhaps of such a change of circumstances, the Circuit Court wisely provided in its final decree" the provision above set forth. "Of this provision of the final decree the State Board of Transportation, if so advised, can avail itself. In that event if the Circuit Court finds that the present condition of business is such as to admit of the application of the statute to the railroads in question without depriving them of just compensation, it will be its duty to discharge the injunction heretofore granted, and to make such order as may be necessary to remove any obstruction placed by the decrees in these cases in the way of the enforcement of the statute."

It is apparent from this extract from the opinion of the Court as delivered by Justice Harlan that the Court contemplated a possibility of the future application of the statute to the railroad companies and its future enforcement. If so, then, in the opinion of the Court, the statute had yet within it the principle of vitality, though undergoing since 1893 a kind of suspended animation. If the statute were unconstitutional at the moment of its enactment, we do not understand how it could ever be constitutional afterwards. If null and void when it left the ambitious lawmakers of Nebraska, we are unacquainted with any vitalizing protoplasm that, dropping upon this law five years after its passage, could transmute it from an unconstitutional, lifeless document into a powerful, self-executing statute.

If the Court has meant to say that this statute was unconstitutional in 1893, but may be constitutional in 1898, we have met with a decision in the Nebraska case that we have never met with in any other. If the Court has meant to say that the statute is not unconstitutional, but cannot be enforced under the facts as they existed in 1893, yet may be enforced some time in the future when circumstances change, we have a proposition equally novel, to wit, that a law may be enforceable to-day, but not to-morrow, enforceable to-morrow, but not next day, enforceable perhaps one year, but not the next year, and so forth, forever. If we once depart from the principle that a law unconstitutional when it is passed, remains unconstitutional forever, we are landed into a condition of things that no man can understand, provide for, or provide against.

We candidly confess our inability to reconcile this decision with any which has preceded it from this Court, and we are unable to say whether the Court has fairly and squarely pronounced the law unconstitutional and forever unenforceable; or, unconstitutional, but, perhaps, some day hereafter, enforceable. At any rate, we are quite sure that the end of the Nebraska case has not been reached yet, the general press reports to the contrary notwithstanding.

The opinion of Justice Harlan on this point may be merely what the lawyers call obiter dicta, but we dare predict it will come back like the ghost of forgotten sins, to plague the Court in its comfort and wisdom.

Annual Reports.

CANADIAN PACIFIC.—To read the annual report of the Canadian Pacific is something like reading the story of one's youth. That road still has certain immense advantages, in that it lies in a country where people are yet disposed to look upon railroads as important aids to their own prosperity, and where the Populist legislator is still insignificant, and where there are immense and rich regions waiting the invasion of the railroad. Consequently, the Canadian Pacific is still in the stage of active and vigorous growth.

The first table below (from the report to Dec 31, 1897) gives the earnings for four different years, beginning with 1888. The gross earnings advanced to a maximum of \$21,400,000 in 1892, then fell to a little less than \$21,000,000 in 1893, and reached the lowest point in the curve in 1894, as a result, of course, of the panic of 1893. In 1896 the gross earnings had not quite reached the high-water mark of 1892, but in 1897, the year under review, they exceeded the earnings of 1892 by \$2,600,000.

	1888.	1894.	1896.	1897.
Passengers.....	\$3,800,883	\$4,840,412	\$4,820,143	\$5,796,115
Freight.....	8,017,314	11,445,378	13,187,589	15,257,897
Mails.....	263,344	498,129	607,544	693,210
Express.....	244,247	342,472	460,272	539,750
Parlor and sleeping cars.....	187,694	331,720	303,688	631,778
Telegraph, grain elevators and miscellaneous, including profits on Pacific steamships.....	682,053	1,294,056	1,302,459	1,490,785
Total.....	\$13,195,535	\$18,752,167	\$20,681,596	\$24,049,535
Expenses.....	9,324,761	12,328,859	12,574,015	13,745,759
Net earnings.....	\$3,870,774	\$6,423,308	\$8,107,581	\$10,303,776

Certain principal traffic statistics for three years are given in the table below, from which, it will be seen that the ton-miles of last year increased 11 per cent. over those of 1896, and, strange to say, the ton-mile rate also increased. It will be seen further that the passenger miles increased 20 per cent., while the rate fell but slightly.

	1895.	1896.	1897.
Freight.			
Tons carried.....	4,274,667	4,442,055	5,174,484
Ton miles.....	1,490,639,847	1,769,958,865	1,955,911,006
Ton-mile rate.....	0.80 cents.	0.75 cents.	0.78 cents.
Passengers.			
Passengers carried...	2,983,793	3,029,887	3,179,589
Passenger miles.....	260,317,256	263,607,453	317,597,951
Passenger-mile rate..	1.80 cents.	1.83 cents.	1.82 cents.

The working expenses of 1897 were 57.16 per cent. of the gross earnings, and the year before 60.8 per cent.

A tabulation of earnings by months shows pretty much the same record that we have become familiar with in the case of the railroads on this side of the border. The earnings for the first five months ran from 1¼ millions up to a little less than two millions per month. For the last five months of the year they were between 2¼ millions and 2½ millions. The President says that the improvement in traffic is due to a large measure to mining development in British Columbia, but that the mining development in the Lake-of-the-Woods district has also contributed in no small degree. He says further that the discovery of gold in the Yukon country has had some effect in the general improvement and is likely to contribute vastly more in the immediate future.

One of the most interesting parts of the report is the statement of recent construction and of plans for the future. Under the agreement with the Dominion Government for building a road from Lethbridge, Alberta, through the Crow's Nest Pass to a connection with the Canadian Pacific at Nelson, B. C. (a total distance of 340 miles), the line has been carried to within 12 miles of the Pass at the summit of the Rocky Mountains and work beyond is well advanced. It is expected to carry the line to Kootenay Lake before the end of August, when temporary connection will be made with Nelson by a train ferry. Through train service will thus be established before the completion of the railroad along the lake, some 60 miles. The Dominion Government assists this undertaking to the extent of \$11,000 a mile. The maximum gradients on this new line through the Rocky and Selkirk mountains are only 52.8 ft. per mile with compensated curves.

But the end of this project is not yet reached. In order that all of its advantages may be gained it is necessary to push on westward from the Columbia River to reach the Boundary Creek district, about 100 miles, and authority will be asked of the stockholders for this work. As preliminary to the Crow's Nest line a section of the Alberta Railway, 109 miles, was purchased. The Crow's Nest line west of the summit of the Rockies is being built under the charter of the British Columbia Southern Railway Company, and the stockholders are asked to approve the purchase of that charter, which carries with it an important land grant, including valuable coal lands near the Pass.

The coal deposits made accessible by the Crow's Nest line "are of great extent and extraordinary character. The aggregate thickness of the beds in the immediate vicinity of the railway exceeds 125 ft." The coal is excellent and is a good coking coal.

Arrangements have been made for the purchase of the Columbia & Western Railway from Robson to Rossland, 33 miles; authority for this will be asked of the stockholders and they are also asked to approve the building of 32 miles of line connecting the Columbia & Kootenay Railroad with Slocan Lake. The Montreal & Ottawa Railway is practically finished to the city limits of Ottawa and will be ready for traffic early in the summer.

But it is not alone in railroads that the company is reaching out. The purchase of the Columbia & Kootenay steamers has been fortunate and additions to the fleet have been made and more boats are required. Two ocean steamers have been bought for the Klondike trade, and the directors have contracted for 11 river and lake steamboats, costing approximately \$300,000, for Southern British Columbia, and for the Yukon. The fleet now includes three Pacific steamships, two Pacific coast steamships, three large lake steamers, 10 river steamers and two ferry steamers.

Heavier rails (70 and 80 lbs.) were laid on 247 miles of main line during the year. Considerable expenditures on capital account were made for rolling stock, elevators, etc., and the stockholders are asked to make liberal provision for rolling stock, shops, etc. Authority is asked to proceed with the double tracking of the line between Montreal and Toronto, as may be expedient.

Five and seven-tenths miles of timber bridges were replaced with permanent structures during the year, and a grain elevator of one million bushels capacity was built at Owen Sound and another, a steel elevator, of 1,500,000 bushels capacity was built at Fort William.

It will be seen from this brief review that the affairs of this company are going on with great vigor and are in a very promising condition. The recovery in prices of farm products has given an impetus to the agricultural development, and most of the established farmers in the Canadian Northwest realized from their crops and cattle in 1897 more than their lands and improvements had cost them. In conclusion, the President says: "The business of Canada seems to have returned to its normal condition, and prosperity is the rule in nearly all sections of the country," which certainly is a cheerful and promising expression.

MISSOURI PACIFIC.—The annual report of the company for the calendar year was published last week. It contains a record of a very prosperous year, with a balance above all charges of \$495,121, against a deficit of \$1,261,762 in 1896. These results were obtained in spite of the fact that Missouri Pacific, like most of the other important railroad companies, fared poorly in the first half of 1897. But when the improvement in revenues began, earnings frequently increased \$500,000 a month and over, so that in the calendar year the increase in gross receipts was \$2,793,491. This was accompanied by an increase of expenses amounting to \$962,787, so that the gain in net earnings was \$1,830,704. The income account of the Missouri Pacific Company and St. Louis, Iron Mountain & Southern consolidated is as follows, the mileage operated being 4,938 in both years:

	1897.	1896.	Changes.
Gross earnings.....	\$24,805,451	\$22,011,960	Inc. \$2,793,491
Operating expenses.....	17,454,111	16,491,324	Inc. 962,787
Net earnings.....	\$7,351,339	\$5,520,635	Inc. \$1,830,703
Other income.....	828,272	532,427	Inc. 295,798
Net income.....	\$8,179,611	\$6,053,127	Inc. \$2,124,483
Charges against income	7,682,490	7,314,889	Inc. 367,601
Surplus.....	\$495,120	*\$1,261,761	Inc. \$1,756,882
*Deficit.			

The surplus for the year, given above, is the first which the company has reported since 1893. Since then the company has passed through very trying times, and was probably saved from the fate which befell so many other companies by the special financial protection which was afforded by the concentration of the ownership of its securities and the relief which was thus practicable when the floating debt of the company had become a dangerous and troublesome element. Even with the increase of over \$2,000,000 in gross earnings as compared with 1896, the company is still far below its best previous figures, but in net returns the 1897 figure is the larger, although the difference is not very great. The following figures show the course of the company's revenues during an interesting period. Expenses as given do not include taxes:

	Gross earnings.	Operating expenses.	Net earnings.
1897.....	\$24,805,451	\$17,454,111	\$7,351,339
1896.....	22,011,960	16,491,324	5,520,635
1895.....	22,672,004	17,021,140	5,650,864
1894.....	21,800,646	16,483,476	5,317,170
1893.....	24,018,339	18,257,168	5,761,171
1892.....	26,344,789	19,238,188	7,106,601

The better net returns in the past year were obviously largely due to the important savings in operating expenses, this account being \$803,000 less than in 1893, when gross earnings were about the same as in 1897, and \$1,784,000 less than in 1892, when revenues

were \$1,540,000 above last year's totals. If we take up the operating expenses for three years we have the following comparative table, 000's being omitted:

	Maintenance of way.	of cars.	Motive power.	Cond trans- portation.	General
1897.....	\$3,464	\$1,536	\$4,579	\$6,999	\$576
1896.....	3,710	1,300	4,208	6,643	540
1895.....	3,873	1,619	4,465	6,518	546
1894.....	3,769	1,537	4,382	6,297	498
1893.....	3,938	1,489	5,093	7,185	552
1892.....	4,486	1,551	5,397	7,203	601

The maintenance of way expenditures show a pretty constant tendency to fall. Those for 1897 are less than for any other of the years named and amount to about \$700 per mile as compared with \$900 per mile in 1892. But during these years the company has carried out some extensive improvements and perhaps it needs to spend less now than formerly to keep its property up to the same standard. The company gives in its reports full data of repairs carried out in its bridge and track departments, and those interested will find details of the condition of the property in each report.

The larger share of the \$963,000 increase in operating expenses in 1897 was absorbed by motive power repairs, this account increasing \$581,000. This was chiefly due to the larger amount of rebuilding going on, 173 engines being rebuilt as against 73 last year. The increased cost of transportation over 1896, some \$356,000, is due to the heavier freight train mileage, which increased 13.9 per cent. In passenger train mileage there was a decrease of 0.6 per cent. In view of the improvement which the company has shown in train loads and in other transportation accounts it seems worth noticing that it has not been able to save materially in the cost of handling traffic as compared with the total of five years ago. The ton mileage in 1897 was, it is true, larger than in 1892, but not very much more, while there was a considerable saving in freight train mileage, and a less saving in passenger train mileage. Freight statistics, with the traffic movement for five years, follow:

	Ton miles (000,000 omitted).	Freight train miles (000 omitted).	Rate, cent.	Train load, tons.
1897.....	2,150	11,094	.843	194
1896.....	1,782	9,738	.865	183
1895.....	1,608	9,249	.99	172
1894.....	1,594	8,970	.96	178
1893.....	1,824	10,650	.92	171
1892.....	2,040	11,476	.93	178

NEW PUBLICATIONS.

"The Railroad as an Element in Education," by Prof. Alexander Hogg, M. A. Press of John P. Morton & Co., of Louisville, Ky. 1897.

We have here a pamphlet of 128 pages, containing an "Address," which covers the whole range of human knowledge. It touches slightly, but not lightly, poetry, chemistry, electricity, philology, the catenary curve, the census, the Bible, socialism and, not to extend the list, dwells largely on the generosity of our rich railroad men. The interest is sustained, and is full of surprises. We find, for instance, that "General orders are beginning to read, 'No man who uses intoxicating liquors will be retained in the service of this company,' and 'The next step will be to prohibit the use of tobacco; a narcotic only.'"

The Address (we are not told in the pamphlet where the Address was delivered) occupies but 25 pages, while to the addenda 101 pages must be charged. But this is not singular, for we find the same independence of method throughout the whole book. For instance, under the head of industrial education, we are told that Texas can furnish 64,000,000 bushels of wheat for exportation. This may be entirely true, and we feel that we can safely accept it, but how can we be persuaded that a very inferior wood cut of the New York and Brooklyn bridge (made probably 25 years ago, before the bridge was built), shown on page 8 of the Address, is really a picture of the new East River bridge, which is just now begun?

The book closes with a sketch of the life of the late Jay Gould, and its peroration is of such a character that we are impelled to quote it:

"Suppose with the death of Mr. Gould the interests he controlled had been destroyed, what would have become of the five hundred thousand dependents upon the daily employment furnished by the forethought, the business capacity, the labor of mind and of body of this man, who, though rich, was both good and great?"

"EXITUS ACTA PROBAT."

"The Birth of Ocqueoc."—The Detroit and Mackinac Railway Company issues a volume about the size of an ordinary monthly magazine, with this not indicative title. The breezy text, evidently written by President Hawks, describes the hunting, fishing and summer resorts and hints at the business opportunities along the line of the road from Bay City north along the Lake Huron beach. The illustrations are fine, most of them half tones, which do not exaggerate, some of them wash drawings, which are distinctly creditable, and a colored frontispiece of October maple leaves—seventy-five pictures. The map shows the line along the Huron coast to Alpena

and from there northwesterly through the wilderness, nearly completed to Cheboygan. Why was this coast section of the road built in the depressing years of 1896-97? This volume tells of the energetic measures taken by the company in building up the watering place at Tawas beach and of aiding and encouraging individual enterprise, and the question is answered by the fact that the new road is already profitable. The rich crop of pine has been taken from North Michigan, but it is not all gone, and this company is trying to make two blades of grass grow where one grew before. Its cheaper transportation is developing through the pine and hardwood forests factories for hoops, staves, headings, handles, excelsior, spools, wood pulp, etc. The road makes a market for the gypsum and limestone. It reaches to the Straits of Mackinac, from where the map shows a short railroad route to Sault Ste. Marie, which may mean much or little.

Commercial and Agricultural Organizations.—The Interstate Commerce Commission has just issued a book showing all existing National, State and local commercial organizations, National, State and local agricultural associations, and the various railroad associations, their location, and the names of the presidents, secretaries and commissioners. The list embraces about 3,500 boards of trade and other commercial societies, about 4,000 agricultural associations, and approximately 300 railroad organizations. The preface contains the announcement that producers and shippers may obtain from the commission without cost information concerning railroad facilities, charges for freight or passenger service, capitalization and operation of railroads, the workings of the Interstate Commerce law and how it has been interpreted by the commission and the courts.

TRADE CATALOGUES.

Steel Gears for Railroad Motors.—The General Electric Company issues a little pamphlet under the title of A Modern Gear Plant, briefly describing the works of that company established at Lynn, Mass., for cutting gears for street railroad work. In the practice of the company the gear wheels are made of cast steel and the pinions of forged steel. It is estimated that at least 50,000 electric motor gears are in daily operation in the United States, and as their life is only about two years, a yearly manufacture of between 20,000 and 30,000 gears is necessary for renewals alone. In the early days of electric railroads cast iron gears with gun metal pinions were used. The steel gears have reduced the weight from 65 to

Abrasion Tests of Car Axles.									
No.	Tests of Axles.	Weight of a cubic inch gms.	Loss, per cubic inch gms.	Loss, per cent.	Analysis.				
A.—Wrought Iron Axles.									
1	Scrap axle	125.75	24.06	19.1	.09	.160	.175	.027	..
2	"	125.80	24.20	19.2	.09	.160	.175	.027	..
3	Michigan Central Railway	125.04	26.38	21.1	..	.138	.302	.033	..
4	"	126.00	24.48	19.4	..	.050	.098	.052	.25
5	"	125.41	28.78	22.9	..	.134	.234	.067	..
6	N. Y., Ont. & W.	125.00	29.08	23.2	..	.164	.213	.039	.26
7	"	125.00	29.65	23.2	..	.164	.213	.039	.26
8	"	125.44	27.65	22.0	..	.147	.237	.032	.32
B.—Steel Axles.									
9	Bess. freight—N.	128.20	25.92	20.2	.12	.012	.078	.109	.52
10	"—N.	127.90	20.92	15.7	.10	..	.075	.101	.54
11	"—T.	127.95	17.01	13.3	.10	..	.075	.101	.54
12	O. H. Pass. No. 21,159—N.	128.26	20.78	16.2	.38	..	.049	..	.60
13	" " " 21,159—T.	128.26	19.42	15.2	.38	..	.049	..	.60
14	" " " 21,812—N.	128.25	16.55	12.9	.38	..	..	..	.61
15	" " " 21,812—T.	128.24	14.06	11.0	.38	..	..	..	.61
16	" " " 21,795—N.	128.00	19.02	14.9	.45	..	.066	..	.51
17	" " " 21,795—T.	128.05	12.35	9.6	.45	..	.066	..	.51
18	" " " 21,827—N.	128.04	11.22	8.8	.47	..	.043	..	.50
19	" " " 21,827—T.	128.04	10.41	8.1	.47	..	.043	..	.50
20	" " " 21,845—N.	128.17	20.92	16.3	.45	..	.054	..	.55
21	" " " 21,845—T.	128.20	12.86	10.0	.45	..	.054	..	.55
22	" " " 22,150—N.	128.00	11.66	9.1	.41	..	.049	..	.75
23	" " " 22,150—T.	128.06	9.69	7.6	.41	..	.049	..	.75
24	" " " 22,153—N.	128.00	14.52	11.3	.38	..	.034	..	.68
25	" " " 22,153—T.	128.10	13.58	10.6	.38	..	.034	..	.68
Steel axles marked N are in natural state after forging. "T" are "Coffin Treated." Heats Nos. 22,150 and 22,153 are basic steel; the rest acid steel.									

Steel axles marked N are in natural state after forging. "T" are "Coffin Treated." Heats Nos. 22,150 and 22,153 are basic steel; the rest acid steel.

70 pounds, and it is said doubled the useful life of the gears. It is claimed that the company is able to produce as sound steel castings as can be turned out in the world, and that the gear cutting machinery in use at the River Works at Lynn cannot be excelled anywhere.

Car Curtains, Car Curtain Fixtures and Car Curtain Materials.—The E. T. Burrows Co., of Portland, Me., has just issued two new catalogues, designated respectively Catalogue C and Catalogue E. The former describes the Burrows curtains and fixtures for railroad coaches and closed street cars, and the latter treats of the use of these materials for open or summer street cars. Both catalogues are well illustrated with the different styles of curtains and curtain fixtures made by the company. The Oakette and Crown car curtain fabrics, which are largely used in connection with the fixtures of the E. T. Burrows Co., are also described.

The Q & C Company, Chicago, has issued a new supplemental catalogue illustrating and describing various styles of the Q & C-Stanwood steel car steps for street cars, and also containing information regarding the new Q & C rail driks for street railroads. This catalogue will be furnished upon request.

The Coffin Toughening Process.

(Continued from page 190.)

(a) is hard enough to resist the heaviest blow and (b) possesses enough ductility or "flow" in the metal to yield some—to "cushion" the blow, as it were. Ordinarily, to have an ideal elastic limit to cover the points of "ductility" and flow of the material, would compel a lowering in ultimate strength, or sacrifice of power to withstand the hard blows.

With the Coffin process this difficulty is eliminated as it enables the forging to have the desired or ideal hardness and, at the same time, the required ductility, because the peculiar treatment increases the elastic limit without change in ultimate strength. This offers to the designer exceptional and ideal material for the claims of severe service coupled with a large factor of safety.

The percentage of axles which have broken under 50 blows is less than the percentage of rejection on the inspection (5 blows at 25 ft. of 1,640 lb. weight) before adopting the process, and this is continually becoming less, as of the last 32 axles tested none have broken, all having had 50 blows. We have on record only one axle carried beyond the 50 blows to breakage; this broke on the 121st blow. Some time since the writer witnessed a test of an axle selected at random (4 in. x 8 in. journal and 4 1/2 in. diameter at center), which on the first 5 blows deflected 7% in., 1/4 in., 6.9-16 in., 1.3-16 in., and 6.3-16 in. respectively, and 44 additional blows (49 in all), before breaking.

Another case where an axle was cut in two after forging, one-half toughened, and then both portions tested under the drop; the half that was toughened broke on the 49th blow, while the remaining half that was untoughened broke on the 6th blow.

The following tests of comparative wear are interesting because the conditions were identical in all cases and the results fairly comparable:

These were made on small 1-in. cubes cut from the wheel-seat portions of the axles and near the surface, the wearing face of the cubes being the portions adjacent to the outer surfaces of the axles. The cubes were all planed accurately to 1-in. dimensions and carefully weighed before and after testing.

The tests were made on the Riehle abrasion testing machine, on a hard, smooth steel disk, about 12 in. in diameter, which revolves in a horizontal plane at the rate of 60 to 62 revolutions per minute. The cubes are held in a frame and rest on this disk, the pressure being obtained by a weighted lever above. A cone motion moves the cube and frame in and out over the disk, to which is attached a revolution counter. The tests were all made on the same disk and under a pressure of 50 lbs. to the square inch. The number of revolutions in all cases was 200,000, taking about eight days' time. Two sets of tests were made on each cube and gave practically the same results.

The results of tests and the chemical analysis of the axles are given in the accompanying table. The amount of abrasion of wear is given in grams and also in percentages of weight or of volume of the original cubes. The diagram shows the comparative wear of several of the specimens which were tested. The results show that the open hearth treated axle has the best wearing qualities; next comes the untreated open hearth axle. The Bessemer freight No.

9 axle shows more wear than some of the wrought iron axles.

And finally, what we consider the most interesting test of all was made by a Western road, where the left side of the locomotive was equipped with case hardened Low Moor iron crank pins, while the opposite side was equipped with Coffin process pins. The pins were applied October, 1892, and at the time report was made, December 3, 1896, had made 156,515 miles and at last accounts (September, 1897) were still in service. The report goes on to say "all the pins appear to be in good shape, smooth and nearly true. Measurements show that the right forward (Coffin) pin is the largest of the four by about one one-hundredth of an inch and one one-hundredth of an inch out of round.

"The right back (Coffin) pin is one one-hundredth of an inch out of round, and two one-hundredths of an inch smaller than the forward pin.

"Left forward pin (case hardened) is about two one-hundredths of an inch smaller than the right forward (Coffin) pin, and about one one-hundredth of an inch out of round.

"Left back (case hardened) pin is one one-hundredth of an inch smaller than right forward (Coffin) pin, and about one one-hundredth of an inch out of round."

New Kinzie Street Drawbridge, Chicago & Northwestern Railway.

The new swing bridge of the Chicago & Northwestern near the Kinzie Street Station, Chicago, was

floated into place last Sunday. The central pier and abutments of the old bridge had been rebuilt without delay to traffic, while the superstructure of the new bridge was erected on false work directly below the old bridge. After the last train passed Saturday night, March 12, the old bridge was raised on scows and floated out of the way, and the new superstructure was brought up and lowered into place.

The new bridge, which provides for two parallel tracks, is a riveted through-truss, 187 ft. 6 in. long, and the trusses are 28 ft. center to center. To prevent interference, when open, with the swing bridge at Kinzie Street on the north, it was necessary to place the center about which the new draw turns directly under the center of the south truss, the bridge being supported by two sets of cone rollers. One set, the balancing wheels, run on a track with an 8 ft. radius, while the maximum radius of the track supporting the outer wheels is 28 ft. 4½ in. As the bridge is built on a skew, revolving it through an angle of 75 deg. opens the channels on either side, so that the outer track is made a segment only of a circle.

The bridge was designed and the construction superintended by Mr. W. H. Findley, Engineer of Bridges of the Chicago & Northwestern, and the superstructure was built by the Lassig Bridge & Iron Works; George P. Nichols & Bro. will install the electrical machinery by which the bridge will be operated, the current for which will be taken from the power station of the railroad adjacent to the bridge. The bridge locks and jacks will be operated by compressed air.

The Ussuri Railroad.

The Ussuri Railroad, planned as the Pacific outlet of the Siberian Railroad, will probably be open the coming season throughout its length of 474 miles between its southern terminus at Vladivostok and the Amoor River at Chabarovsk, in the general direction north 25° east. We shall realize its position best by comparing it with a line from the north line of California across Oregon and Washington to Puget Sound. The Ussuri Railroad is built near the Chinese border, nearly parallel with the coast and for the most part about 180 miles inland, and is separated from the sea by parallel ranges of mountains almost absolutely barren. The valleys through which it is built are liable to overflow, and grain can be produced only by sowing it on ridges thrown up by the plow, and then is frequently so mouldy as to be unfit for food.

The climate is more severe than in the corresponding latitude on our coast, but much milder than in Siberia proper. The mean temperature at Vladivostok is 10° Fahr. in winter and 64° in summer, and at Chabarovsk—8° winter and 66° in summer. The rainfall is deficient, 14 in. at Vladivostok and 22 in. at the northern terminus.

As the Siberian Railroad is to have an outlet to a port in China, near cities with a great commerce, by a much shorter route which will pass through a populous country, the Ussuri Railroad loses much of its importance and may never have a rail connection with the Siberian line. But it will remain the outlet of the great Amoor basin, that river being navigable for hundreds of miles, and much of the distance above Ussuri passing through a fertile country; while its course below Ussuri is not fitted for an outlet for traffic.

The southern 256 miles of the Ussuri Railroad, from Vladivostok to a point on the river where it is navigable, has been open for more than three years; but its traffic has consisted very largely in carrying materials and supplies for the North Ussuri Railroad and the men employed in building it. By it and the steamboats on the Amoor the ambitious traveler will be able next summer to penetrate far into the interior of Asia, well towards Lake Baikal.

Foreign Railroad Notes.

A Russian official has been negotiating with the authorities in Berlin to secure lower rates on Russian petroleum shipped to Germany. In the first half of 1897 the shipments of petroleum and its products from the oil fields at Baku to the Black Sea at Batum amounted to about 163,000,000 gallons, compared with 63,000,000 in the first half of 1896. The exports from Batum in the first half of 1897 were 141,000,000 gallons of petroleum and its products, 98,000,000 of which was oil; but of this latter only 27,280,000 gallons, or 28.3 per cent, went to European markets. Now, in 1896, 44 per cent. of the Batum exports went to European markets and in 1895 47 per cent. Thus it would seem that the Standard Oil Co. has not permitted the European market to slip away from it, and Russian oil has had to look for a market in Asia Minor, Egypt, India, etc.

Some German newspapers, especially the Socialist organs, lose no opportunity to cast slurs on the Prussian State Railroad administration. It has authority to give rewards to employes by whose vigilance or thoughtfulness an accident has been avoided. A newspaper recently declared that a locomotive en-

gineer who had done such a service was rewarded with the magnificent sum of two marks—48 cents. It seems that it was not true, and that such rewards are usually 50 or 100 marks, and sometimes 300; but the story has gone the rounds of the papers all the same, and has served as text for some very sarcastic sermons.

The people who are thinking of taking a run over to China when the Siberian Railroad is finished, will do well to bear in mind that it takes 4 days and 16 hours by the fastest trains to get from London to the near end of the Siberian Railroad, and that the latter, abbreviated by the Chinese cut-off, will be 4,400 miles long.

The Hungarian millers seem to have trouble in selling their flour, and the State Railroads have recently made a great reduction in the freight rates on flour shipped to Fiume, on the Adriatic, to be exported to British, Dutch, Belgian, French Atlantic and Brazilian ports, and through the Suez Canal to Eastern Asia. The reduction amounts to about 9 cents per 100 lbs. below the regular rate, which has been about 22 cents. To get the benefit of the reduction, the mills must make their shipments to ports beyond Gibraltar exclusively by way of Fiume, and shipments to Brazil must go by certain specified steamship lines.

The Austrian railroads in 1897 carried about 2 per cent. more passengers and 3½ per cent. more tons of freight than in 1896, and earned 1¼ per cent. more. As the length worked increased from 10,335 to 10,615 miles, the earnings per mile decreased slightly—from \$12,049 to \$11,941. The largest earnings per mile of any railroad were \$51,090.

The report of the Hungarian State Railroads has an entry of considerable significance not usually found in railroad reports. This is, the average time that each kind of rolling stock was withdrawn from use on account of repairs. During 1896, on the average, 16.3 per cent. of the Hungarian locomotives, 8.8 per cent. of the passenger, baggage and mail cars, and 5.5 per cent. of the freight cars were out of service for repairs; in 1895, a larger proportion.

The Berlin City Railroad (elevated), which serves as an entrance to main lines entering the city, and has their suburban traffic, or part of it, as well as a city traffic pure and simple, has not had a very large city traffic, but it is growing. In the year ending with March last, its earnings from that traffic were \$1,583,000, which is 33 per cent. more than the year before, and twice as much as in 1890-91.

TECHNICAL.

Manufacturing and Business.

The Hartford City Gas Light Company, of Hartford, Conn., has placed another contract with the Berlin Iron Bridge Company, of East Berlin, Conn., for a steel roof lined with patent anti-condensation fire-proof roof lining.

Pawling & Harnischfeger of Milwaukee, Wis., have received an order from the Consolidated Traction Co. of Pittsburgh for a 50 ton traveling crane, with a span of 55 ft., a runway 250 ft. long and a lifting capacity of about 50 tons. This company has just finished an electric crane for the Midvale Steel Co., Philadelphia, being one of five which the latter company has ordered. It is a 40-ton double trolley five motor traveling crane to be used in the oil tempering plant.

The Edward P. Allis Co. of Milwaukee, Wis., has sold to the Aetna Standard Iron & Steel Co. of Bridgeport, O., for the Mingo Junction plant, one of their steeple type, cross compound, condensing blowing engines. This engine will be capable of delivering 40,000 cubic feet of free air per minute at 20 lbs. pressure to the square inch.

At the annual meeting of the stockholders of the Dickson Locomotive Works, held at Scranton, the following were elected directors: Robert Olyphant, S. S. Palmer, Mark T. Cox and R. R. Brown of New York; H. M. Boies, C. H. Zehnder, C. C. Rose, W. H. Storrs and C. S. Weston, Scranton.

The cars for the two new express trains for the Chicago, Milwaukee & St. Paul, being built by the Barney & Smith Car Company, will be equipped with the two-coil, jointless steel, fire-proof Baker heater. Mr. Baker also reports that he has just furnished 28 single coil fire-proofs for the Great Northern Railway's new cars, building at Barney & Smith Company's. Louisville & Nashville, Missouri Pacific and Pennsylvania lines have also been liberal buyers of his fire-proof heaters during the last few months.

The report of the Wagner Palace Car Co., for the quarter ending Dec. 31, 1897, shows gross earnings to be \$809,174, expenses \$609,422 and net earnings \$199,752.

The Lap Joint Railway Track Co. of Bound Brook, has been incorporated in New Jersey with a capital stock of \$100,000, by Charles H. Moore, Fanwood, N. J.; Harry M. Herbert, Bound Brook; Henry C. Day,

Northampton, Mass.; Thomas H. Hibbon and Volney W. Mason, Jr., of New York.

The St. Louis Car Wheel Co. has filed articles of incorporation in Missouri, with a capital of \$250,000, fully paid. J. H. Bass holds 2,496 shares and John W. Nute, S. F. Pryor, John J. Morse and Judge H. S. Priest one share each.

The Pegamoid Leather, Textile & Paper Co., Jersey City, has been incorporated in New Jersey with a capital stock of \$1,000,000 by Theodore A. Dodge, Arthur W. Pope, Edward H. Haskell, Boston; Thos. Russell, Montclair, N. J.; Henry L. Herbert, Garden City, N. Y.; William B. Pierce and Gilbert S. Herbert of New York.

The Railroad Station & Car Advertising Co. of Jersey City, has been incorporated in New Jersey, with a capital stock of \$300,000, by Ansley S. Davis, St. Louis, Mo.; John R. Dos Passos and R. Natili, New York.

Iron and Steel.

A return just issued shows that during the past year 35,875 tons of American pig iron were imported at the port of Hamburg, in Germany.

The official returns show that during the year no less than 18,036 tons of steel rails were exported from Germany to England.

It is reported that the Erie Foundry Co., Erie, Pa., has received an order from the Otto Gas Engine Co. for castings for 140 engines.

The Glendon Rolling Mill, Glendon, Pa., has started up after an idleness of two months, and will run double turn, giving employment to nearly 200 men.

The annual report of President E. C. Felton of the Pennsylvania Steel Co. shows that in the operation of the Steelton (Pa.) works there was a net loss for the year 1897 of \$124,000, although the last six months of the year showed a profit of \$163,000. The Maryland plant at Sparrow's Point was worked on ores purchased in 1895 at high prices and the comparative inefficiency of new workmen rendered it impossible to operate the plant at a profit. However, according to the cost sheet for January, 1898, the plant is now being operated at a profit. The report suggests that, owing to the increase in business, more capital is needed, which makes it necessary to provide a fund. To accomplish this it is proposed to offer for subscription to the stockholders \$300,000 of the Maryland company's 5 per cent. bonds and \$500,000 consolidated 6 per cent. bonds now in the treasury of the company.

The Delaware Iron Works, Newcastle, Del., have started up after a suspension of four months.

Newspapers state that the London (England) iron trade has been considerably stirred by an article which appeared in "The Statist" pointing out that the exports and consumption of iron have exceeded the whole output of the United Kingdom by nearly half a million tons; and predicting a pig iron famine before the end of the year. "The Statist" concludes: "There is quite a large probability that we may have to fall back upon America at no distant future to make good our deficient supply—on America, once our largest buyer of pig and finishing material."

After an idleness of two and a half months the puddling department of the mill of the Reading Iron Co., at Reading, Pa., will resume operations on March 21, giving employment to 175 men.

The Aetna Standard Iron & Steel Co. of Bridgeport, O., is making some improvements and additions to its Bessemer steel plant at Mingo Junction, O. Large converters are being installed and new rolling mill equipment added. New blowing engines are also being added to the blast furnace equipment.

New Stations and Shops.

The plans for a large new passenger station for the Pennsylvania lines at Pittsburg, Pa., are now being prepared by D. H. Burnham & Co., Architects, Chicago. On Friday last the officers of the company announced at Pittsburg that the work of building the station had been decided upon and that the tracks would be elevated. The new station will be on the site of the present one. The main line of the Fort Wayne road will be elevated so as to cross above the streets between the station and the Allegheny River bridge, and the elevation will continue across the river and through Allegheny City. The Pittsburgh, Cincinnati, Chicago & St. Louis, which diverges to the south at the station, will not be elevated.

The Cleveland Terminal & Valley has placed a contract with the Variety Iron Works of Cleveland, O., for the building of a storage warehouse at Cleveland, of either corrugated wrought iron or corrugated steel, the dimensions of which will be about 50x500 ft.

The New York, New Haven & Hartford has come to an agreement with the city of Providence concerning the platform sheds for the new Union station in that city, and it is said that the sheds will be built substantially as asked for by the city. The station proper and the adjoining buildings have been finished for several months, but the railroad company has refused to build the sheds and the city has refused to allow the station to be used with uncov-

ered platforms. It is said that it will be several months before the sheds can be put up and finished.

Interlocking.

The Illinois Central will erect inter-locking signals at Ashley, Ill., at the crossing of the Louisville & Nashville, and also at Monticello and Tolono, Ill., where the Illinois Central is crossed by the Wabash.

A Chance for Architects and Engineers.

The Royal Administration of the Swedish State Railroads invites civil engineers or others to a competition of designs for the arrangement of new railroad stations, junctions, etc., for the city of Stockholm. The first prize is to be 12,000 Swedish crowns (about \$3,230); the second, 8,000 Swedish crowns (about \$2,150), and the third, 4,000 Swedish crowns (about \$1,075). The time for competition will expire at noon on the 31st of August, 1898.

Particulars concerning the nature of the work will be furnished by the Swedish-Norwegian Legation, 2011 Q street, Washington, D. C., or by the Vice-Consul of Sweden and Norway, Mr. August Peterson, LeDroit Building, corner F and Eighth streets, Washington, D. C.

Tie Plates.

We hear that the Great Northern Railway is going extensively into malleable iron tie plates. The story is current, in fact, that perhaps 500,000 such tie plates will be made at once for that road.

Rapid Transit Matters in New York City.

The Appellate Division of the Supreme Court of New York on the 11th rendered a decision on the application of the Board of Rapid Transit Commissioners for a rehearing in the matter of the \$15,000,000 bond. The earlier decision is modified in that the decision now rendered specifies a bond of \$14,000,000 to cover the period of construction and equipment, while the continuing bond, designed to secure operation by the contractors, is reduced to only \$1,000,000. Obviously, this makes the matter of getting contractors very much simpler.

Another step in the progress of New York rapid transit matters, which may be important, was the introduction on the 14th at Albany by Senator Ellsworth, the Republican leader in the Senate, of a bill to bring to an end the present Rapid Transit Commission and to create in its place a bi-partisan commission. This bill authorizes the Mayor to appoint a commission to consist of four citizens of New York, not more than two of whom shall, when appointed, belong to the same political party. It would be superfluous to speculate as to whether or not the present political leaders of New York have agreed upon this bill and will "jam it through," but it has seemed for some time that such a step would probably be taken.

Oil on the Ballast.

Articles were filed in Trenton, N. J., March 9, incorporating the Dustless Roadbed Company, with an authorized capital of one million dollars. The company is formed to develop patent rights and secure dustless roadbeds for railroads, race tracks, etc., and the incorporators are A. J. Cassatt, W. B. Henry and O. H. De Rouse, of Philadelphia; James H. Nichol and H. M. Snyder, Jr., of Camden, N. J. We judge that the company will exploit the patents of Mr. Nichol for the use of oil on the surface of ballast or roadways. The reader will remember that we described the experience with this on the West Jersey & Seashore in our issue of Aug. 6, 1897.

Public Improvements at Chicago.

Bids on two conduits for the new intercepting sewers were opened last week, the lowest and successful bidders being James H. Roche, \$28,041 (for Twelfth street), and Byrne & Shortall, \$65,949 (for Twenty-second street). Work was at once commenced by these contractors and will be pushed rapidly. The contractors promise to have these two conduits finished by May 15, and they will divert to the river 40 per cent. of the sewage which now pollutes the lake. Contracts for other intercepting sewers will be let soon. The total length of the new sewers will be about 17½ miles, and the estimated cost \$3,300,000, which will be defrayed from the water fund.

Plans have been completed by the Commissioner of Public Works for remodeling the City Hall, \$15,500 having been appropriated by the Council for that purpose. The stone portico and entrance on La Salle street will be removed, and the electric lighting plant will be improved at a cost of \$5,000. The balance of the fund will be used for interior decorating, and refitting.

Electric Headlights.

The Chicago, Rock Island & Pacific has decided to equip all engines which haul important passenger trains at night with electric headlights, but the ordinary headlights will not yet be discarded on all passenger engines. This road has had several engines equipped with Pyle-National electric headlights for the last two years.

Ammunition and Projectiles.

Bids were opened in the office of the Ordnance Bureau of Washington for furnishing projectiles as follows: 149, 8-in. armor-piercing shot, capped; 150, 8-in. armor-piercing shells; 482, 10-in. armor-piercing shot, capped; 481, armor-piercing shells; 1,241, 12-in.

deck-piercing shells, weighing 800 lbs. each, and 935, 12-inch, deck-piercing shells, weighing 1,000 lbs. each, the following companies bidding: Midvale Steel Co., Philadelphia, Pa.; Benjamin Atha & Illingsworth Co., Newark, N. J.; Firth Stirling Steel Co., Reading, Pa.; Carpenter Steel Co., Pittsburgh, Pa. The Midvale Steel Co. requires but 90 days for the entire lot.

Rails for Japan.

During the past week the Carnegie Steel Co., Ltd., has received orders for 3,000 tons of 60-lb. rails for the Nippon Railroad and for 250 tons of 50-lb. rails for the Nankin Railroad, both of Japan.

THE SCRAP HEAP.

Notes.

The Illinois Central has extended record discipline to the lines south of the Ohio River.

An Iowa court has sentenced to the penitentiary for life two men convicted of attempting to wreck a train.

The leaders of the railroad brotherhoods—the firemen, brakemen and telegraph operators—have once more announced that they have formed a federation.

The freight and passenger men of Buffalo have formed "The Transportation Club of Buffalo," the object of which is chiefly social. The president is Mr. T. S. Timpson, General Eastern Agent of the Lake Shore.

The Atchison, Topeka & Santa Fe has resumed the practice of giving special permits to traveling salesmen to ride on through freight trains. There was an attempt at a concerted movement to discontinue these permits on Jan. 1, but it was found impossible to get all of the roads in the Western Passenger Association territory to agree to it.

The village of Upper Alton, Ill., has sued the Chicago & Alton Railroad for \$648,000, this sum being the aggregate of 6,480 penalties of \$100 each for running trains through the village at a rate of speed faster than that prescribed by the village ordinance. It is said that if the company will establish a certain station which the village wants the suit will probably be dropped.

The State Railroad Commissioners of Missouri have published a report declaring unsafe the track of the Chicago & Alton between Cedar City and Mexico, 50 miles. The report goes into considerable detail, speaking of rotten ties, track "badly warped," shims 4 in. thick, etc., and a notice has been sent to the railroad company notifying it to make necessary repairs. A Kansas City paper intimates that the Commissioners are persecuting the railroad company because they have been unable to enforce their order requiring the abolition of platform gates on passenger cars. The Alton road has gates on all of its local passenger trains and has for several years employed train gatemen, who compel passengers to purchase tickets before they enter the cars.

A New Railroad in Cuba.

An undertaking which is at present being carried out by the Spanish authorities in Cuba is the railroad line from Manzanillo east about 30 miles to Bayamo. So near completion is this short road that the final shipments of track material and rolling stock will, it is said, go forward on the steamer sailing March 19. The rails are being furnished by the Pennsylvania Steel Company, three locomotives by the Baldwin Works and the rest of the materials by a New York machinery house, which has had charge of the shipping and purchases for the Government. The road has cost about \$45,000.

The Chicago Drainage Canal.

The annual report of Chief Engineer Randolph shows that the construction to January 1 covered 95.4 per cent. of the whole work. During the past year 15 per cent. of the work was done. The principal work remaining is the tail race at Joliet and finishing the sections in the vicinity of Willow Springs. The value of the work done during the year was \$1,122,072. The total expenditure for engineering and construction from the inception of the work amounts to \$19,247,289.

Swiss Government Purchase of Railroads.

The election to settle the long and bitterly discussed question of the purchase of the five main railroad lines of Switzerland by the Government was held yesterday (Sunday, February 20), and by 8:30 o'clock in the evening the general result was known in every town and city in the Republic.

The total number of votes cast was 560,892, each citizen above the age of 21 having the right of suffrage. Of this number of votes, 384,382 were in favor of and 176,511 against the purchase, making a majority in favor of Government ownership of 207,871. The roads to be purchased are as follows: Jura Simplan, Swiss Northeast, Swiss Central, United Swiss, and Gotthard. On the 6th of December, 1891, the question of the purchase of the Swiss Central Railroad was voted upon, and the vote cast was 420,500. The number in favor of the purchase was 130,500 and the number opposed was 290,000, the majority against the purchase being 169,500. Thus it will be seen that there has been since 1891 a great change in the minds of the people of Switzerland concerning the Government ownership of railroads, and this change has been brought about by a thorough discussion of the subject in the press and on the platform. Never before in the history of the Republic has such a bitter contest been waged, and never before has the Government received such a large majority.

The amounts estimated as being the cost of construction and equipment of the five main lines are as follows: Jura Simplan, \$54,494,000; Swiss Northeast,

\$44,250,000; Swiss Central, \$28,200,000; United Swiss, \$15,255,000; Gotthard, \$48,794,000; total, \$190,998,000. The total length is 1,700 miles, and the amount that the Government will have to pay for these roads is estimated at about \$200,000,000. The total receipts in 1897 were \$20,722,600. An average of 5 per cent. dividends has been declared during the past five years. The number of persons employed is about 25,000—Consular Reports.

Electric Railroads and Lights in France.

Consul Jackson of Cognac, under date of February 25, 1898, reports that the city of Niort proposes to have an electric railroad and lights for its streets. Communications should be addressed to Monsieur le Maire de la Ville de Niort, Deux-Sèvres, France. There is also, says the Consul, a movement on foot to connect La Rochelle with the new port, La Pallice, by an electric line 2½ miles long. Communications should be addressed to Monsieur P. W. Morch, Chambre de Commerce, La Rochelle, France.

The Nicaragua Company.

The stockholders of the Nicaragua Co. met in New York City March 10 and elected the following directors: J. W. Miller, R. E. Edwards, J. R. Bartlett, Henry E. Howland, Warner Miller, W. T. Cochran, Gordon MacDonald, H. D. Pierce, Henry A. Parr, E. R. Lancaster, Stuyvesant Fish, H. R. Hoyt, Hermann Oelrichs, R. E. F. Flinsch and John J. Emery. The new directors are Messrs. Cochran, MacDonald, Parr, Lancaster, Oelrichs and Flinsch.

Notes from England.

Great activity prevails in the English midlands among railroad car and coach building works. For the Cape of Good Hope government railroads important orders to the value of about a million dollars are in hand and the South Eastern Railway has placed orders amounting to about \$750,000.

There has just been opened at Blackpool a compressed gas tramway running from Lytham to Blackpool. There is already in existence the Corporation electric conduit tramway, which it is proposed to change to the trolley, and another line (electric trolley) to Fleetwood is now in course of construction. The three lines will together make a 21-mile journey along the coast possible. There will be a seven-minutes' service, on the gas system, in the summer, and a half-hourly service in the winter.

The Rush to Alaska.

A consular report from Victoria, Feb. 15, says: "The advance division of the army of prospectors bound for the Klondike gold fields has arrived on the Pacific coast, and in even larger force than was anticipated so early in the year. At least four-fifths are Americans, though many come from England and from various British colonies. There are at least fifty steamers and schooners constantly and solely employed in carrying men, stock, horses, dogs and provisions up to the North. Most of these are from the Sound, and the majority are American ships, manned and owned by Americans and displaying the Stars and Stripes. A list just published shows that forty-two steamers and twenty-four sailing craft are now engaged in this trade between Puget Sound and Dyea, Skagway, Wrangell, and other Alaskan ports. About one-third of the American steamers touch at Victoria on their way north. In addition to this fleet, twelve British steamers and several schooners sail from this port as often as they can make the trip, which is every two weeks. Sometimes several Alaska steamers leave this port in one day. Many old hulks that had been idle for years have been overhauled, repaired, equipped and pressed into this service, and all go loaded to their utmost capacity. As a natural result, the price of passage has already been advanced 25 per cent. and strikes frequently occur among the men employed on the steamers. This congestion will be much relieved when the ocean steamships arrive, which will be next month—unless, indeed, the throng increases as the days lengthen. The outfitting trade is the subject of fierce competition among the different cities. It has given new life and caused material prosperity, such as they have not known for years."

Lecture at Purdue.

Mr. F. A. Delano, Superintendent of Freight Terminals of the Chicago, Burlington & Quincy, and President of the Western Railway Club, lectured on March 9 at Purdue University on Railroad Engineering. Under this broad subject he discussed the development of railroads, the general principles involved and the tendencies in present practice.

Massachusetts Institute of Technology.

The foundations are being laid for, and it is expected that Aug. 1 will see the completion of the new building, 58 x 161 ft., designed to accommodate the expanding departments of the Institute. The departments of Architecture, Biology, Chemistry and Mechanical Engineering will all benefit directly by this increased space, and most of the other departments will gain space indirectly. The extension of the Laboratory of Applied Mechanics will include, besides its space in the new building, the basement of the present Architectural Building. The third floor of the work with the Corps for some years, and resigned in Architectural Building, vacated under the new arrangement, will be used by the department of Naval Architecture for lecture, drawing, reading and model rooms, and will thus relieve the Mechanical Engineering Department by so much space. The fourth and fifth floors of the Architectural Building will provide for the expansion of the Civil Engineering Department. The fifth floor of the Engineering Building will be given over practically entirely to the second year surveying work. This step is rendered necessary by the recent increase in men studying Mining Engineering.

Lake Notes.

The Chicago & Milwaukee Transportation Company has been organized at Chicago with \$1,000,000 capital. E. W. Herrick is President and Treasurer, and G. S. Whitslar, General Passenger Agent. The new company will compete with the Goodrich line, and has bought the whaleback Christopher Columbus, which it was recently rumored had passed into the control of the Goodrich people. This vessel will now be refitted at a cost of about \$25,000, and will commence regular trips between Chicago and Milwaukee about June 20. Plans have also been prepared for two new boats, one to be a whaleback similar to the Christopher Columbus, both of which

will be used for night service between Chicago and Milwaukee, touching at Waukegan and Racine, and carrying both freight and passengers.

The Chicago Shipbuilding Company has received an order for a new ore steamer for the Minnesota Steamship Company, to be built after the designs of Mr. W. I. Babcock of the shipbuilding company. The vessel will have a length over all of 430 ft., depth of hold 28 ft., and beam 48 ft. It will be somewhat larger than the William R. Linn, recently launched from these yards.

Fuel Records on the Wabash.

The following circular of the Wabash Railroad explains itself:

"Beginning March 1, 1898, an individual account will be opened with each engineer, to which all coal used by him will be charged. At the same time the car mileage made by such engineer will be computed, and at the end of the month a statement issued showing the performance of each engineer based upon the number of pounds of coal consumed per car mile by each, those having the best record in their respective classes being at the top. This is intended to place each engineer strictly upon his individual record, with a view of determining who are the most economical in point of fuel consumption, and the showing of each in this regard will be considered in connection with promotion and preferment in the service.

"The new form of coal ticket is intended for use by road engines only. Each engineer will be furnished a book of tickets, which he will retain until the end of the month, regardless of the engine upon which he is engaged. An engine going out on a run is delivered to the engineer with a tank full of coal, or its equivalent in tickets, and the engineer is required to give tickets, not only for the coal taken on the trip but also (in case of changing engineers) for a sufficient amount to put the engine into the house at the end of the run with a full tank of coal, the same as he received it. In case of engineers changing at terminals where no coal is issued, the engineer giving up the engine must give to the hostler tickets to an amount equal to the number of tons that would be required to fill the tender. These tickets must be delivered by the hostler to the engineer taking the engine out, and he can use them at the next coaling station to replenish his supply."

Laws, Bills and Bancombe.

The New Jersey Legislature has passed the long-pending grade crossing bill of Senator Johnson, which gives the city and town officers throughout the State power to require gates at any railroad crossing, subject, however, to the approval of the Court of Chancery. Governor Pingree of Michigan has issued a proclamation calling an extra session of the Legislature March 22. The proclamation sets forth that the railroad, express, telegraph and telephone companies own one-third of the property of the State, but pay only one twenty-sixth of the taxes, and that therefore the Legislature must consider the revision of the tax laws. The Governor has also issued another proclamation enjoining upon all people to refrain from accepting free passes on railroads. He declares that the acceptance of passes is a crime under the State law. He calls upon Justices of the Peace, prosecuting attorneys and judges of the higher courts to enforce the law. He also calls on the clergymen to stop accepting reduced rates on the railroads. Free rides and reduced rates rob the school children of a certain amount of tax on railroad earnings.

In the Ohio Legislature a sweeping measure has been introduced to fix all railroad freight rates at not over 110 per cent. of the lowest rate per mile accepted by the roads on long-distance interstate shipments, also requiring L. C. L. rates to be not more than 10 per cent. above carload rates. The bill is so radical that probably it has no chance of passage. Another bill introduced in the Ohio Legislature requires the railroads to furnish free transportation to the Governor and all State officers. In the New York Legislature there is a bill requiring the street railroads to have fenders or their equivalent on all cars. This bill applies only to cities of 60,000 inhabitants or more, and it is proposed to go into effect Jan. 1, 1899.

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works are building one engine for the Florence & Cripple Creek Railroad.

The Chicago, Rock Island & Pacific is reported to be preparing specifications for some new locomotives.

We are informed, but not officially, that the Iowa Central will buy five new heavy freight locomotives in the near future.

The National Docks Railroad has placed an order with the Baldwin Locomotive Works for one switching locomotive.

It is rumored that the Illinois Central will soon place orders for a large number of locomotives, probably 50 or 60. The road has placed an order with the Brooks Locomotive Works for 10 new engines.

The Ottawa, Arnprior & Parry Sound Railroad has placed an order with the Baldwin Locomotive Works for ten 10-wheel engines.

The Baldwin Locomotive Works have received an order for 15 heavy mogul freight engines from the Egyptian State Railways.

The Delaware & Hudson Canal Co. has placed an order with the Dickinson Locomotive Works for two mogul engines, one simple and one Dean compound, with Wootten boilers.

The Seoul & Chemulpo Railroad of Corea is figuring on buying a few more engines. The Brooks Locomotive Works recently built four for this road. One of these was illustrated in our issue of March 4.

The three class H mogul locomotives which the Chicago, Burlington & Quincy is building at its West Burlington shops are now being erected, and the first one will be completed in about ten days. This road is also building three new class H engines at its Aurora shops.

The Schenectady Locomotive Works have just received an order for 12 eight-wheel locomotives, with 16x24 in. cylinders, for the Klushu Railway of Ja-

pan, the engines being duplicate of a similar order completed by the Schenectady Works for the Klushu Railway last fall. The previous order of 12 engines are now running and giving very satisfactory service.

The ten freight locomotives ordered by the Chicago, St. Paul, Minneapolis & Omaha from the Schenectady Locomotive Works, as mentioned in this column March 5, are to be ten-wheel engines, with cylinders 19x24 in., 59 in. drivers, weight of engine 139,000 lbs., of which 105,000 lbs. will be on the drivers, steam pressure 190 lbs., tender capacity 4,500 gals. and fire box dimensions 96½ in. long by 40½ in. wide. The one eight-wheel passenger engine will have 73 in. drivers, weight of engine 125,300 lbs., of which 78,300 lbs. will be on the drivers, the other details to be the same as the freight engines.

CAR BUILDING.

The Rutland Railroad is in the market for 450 freight cars.

It is reported that the Union Pacific will order 5,000 more cars.

The Ensign Mfg. Co. is building 150 cars for the Ohio River Railroad.

The Chesapeake & Ohio is asking for bids on from 300 to 700 flat and hopper bottom gondola cars.

The Narragansett Pier Railroad is having one passenger car built at the works of Jackson & Sharp Co.

The Missouri Car & Foundry Co. is building 10 freight cars for the Shreveport, Red Wing & Southern.

The Merchants' Despatch Transportation Co. denies the report that it is in the market for 100 box cars.

Rhodes, Curry & Co., Ltd., of Amhurst, N. S., is building 50 new box cars for the Intercolonial Ry. of Canada.

The Delaware, Lackawanna & Western will probably shortly let a contract for from 300 to 500 new freight cars.

The Seoul & Chemulpo Railroad of Corea will probably let contracts in the near future for about 100 freight and passenger cars.

We are officially informed that the Flint & Pere Marquette has not as yet asked for any bids on freight cars, as reported by a railroad paper last week.

The Chicago, Burlington & Quincy is putting wide vestibules on a lot of chair cars and taking platforms off of mail cars, the work being being done at the Aurora shops of the road.

The Hoosac Tunnel & Wilmington Railroad has just built eight 40-ft. flat cars of 50,000 lbs. capacity at its Readsboro shops. The trucks were furnished by the Detroit Wheel & Foundry Co. of Detroit, Mich.

We are officially informed that the Northern Pacific is considering the purchase of 300 flat cars 41 ft. long. It is not yet determined, however, whether part or all of these will be built at the company's shops.

In our last issue we referred to the Louisville & Nashville as being in the market for 600 cars. We are now officially informed that specifications are being prepared for 500 gondolas 36 ft. long, and 100 furniture cars 45 ft. long.

A number of reports have been published by both daily and technical papers to the effect that the Great Northern will order several hundred freight cars. At the time of going to press we were unable to obtain any authentic information, but we understand that a large order will be given to Haskell & Barker.

The two dining cars and four composite cars ordered by the Chicago, Rock Island & Pacific from the Pullman Co., and noted in our issue of March 5, are to be delivered in April. The dining cars are 63 ft. 8 in. long by 10 ft. wide over car body, and the composite cars are 70 ft. long by 9 ft. 8 in. wide. The six-wheel trucks and a number of other details are to be the standards used by the road. All the cars will have wide vestibules and standard steel platforms and are to be up-to-date in finish and equipment.

The 200 flat cars ordered by the Kansas City, Pittsburgh & Gulf from the Pullman's Palace Car Co., and noted in our issue of last week, will be equipped with Westinghouse air brakes, Cloud trucks, Tower couplers and Bettendorf bolsters. The Pullman Company has also received an order to build three combination, baggage and mail cars, with blind platforms and anti-telescoping vestibules, National couplers and buffers, Westinghouse air brakes and Pintsch gas, for the same road, and two combination baggage and mail cars of the same design for the Kansas City & Northern Connecting Railroad.

G. W. Ettenger, dealer in railroad materials, London, England, is asking for bids on a number of cars for a standard gage electric railroad. Quick delivery is required.

The receiver of the Metropolitan West Side Elevated of Chicago has asked permission from the court to put on eight additional trains, and to buy eight new motor cars at a cost of \$42,000. It is probable that the permission asked for will be granted and that orders for the new cars will be placed soon.

BRIDGE BUILDING.

ALBANY, N. Y.—A bill has been introduced in the Assembly to provide for a lift bridge over the canal at Nineteenth St., Watervliet.

ATCHISON, KAN.—It is stated that a company owning a charter to build a bridge over the Missouri River at Atchison has made a proposition to the City Council, offering to give the charter, providing the city would build the bridge.

BETHLEHEM, PA.—There is talk of an iron bridge to be built between Bethlehem and South Bethlehem to replace a wooden structure.

CHARLESTON, S. C.—The Charleston & Seashore

Railroad Co. (see Electric Railroad Construction column) will build a steel drawbridge over the Cooper River.

CINCINNATI, O.—Press reports state that a bridge will be built in Madisonville. Frank S. Krug, Engineer, Hamilton County.

CONDON, ORE.—A new bridge will probably be built by the Commissioners of Gillman County at Fossil.

CUMBERLAND, MD.—The West Virginia Central & Pittsburgh proposes to build an overhead street bridge at Market street, at their yard in Cumberland, Md. (March 11, p. 185.) Arrangements have been pending for some time, but now the railway company and a committee of Council have come to an understanding, and it is proposed to push the work to completion. The bridge is to be one span 60 ft. and two spans 50 ft.; total of 160 ft. To have 16 ft. driveway and sidewalks on either side. It is to be a plate girder bridge.

DES MOINES, IA.—The Board of Public Works, it is stated, will advertise for bids for building a bridge across Four Mile creek.

DETROIT, MICH.—The Union Bridge Co. (Feb. 11, p. 108) has filed articles of association with the Secretary of State. The company is capitalized at \$2,000,000, and its purpose is to build a railroad bridge across the Detroit River for use by all connecting railroads in the United States and Canada. The incorporators are the Grand Trunk and Wabash, who own 19,880 of the 20,000 shares of stock.

HAMBURG, ARK.—The Mississippi River, Hamburg & Western, now building a railroad east from Hamburg to a point on the Mississippi River, will build an iron drawbridge across Bayou Bartholomew, Ark. J. M. Parker, Hamburg, Ark., is President of the road.

KING WILLIAM, VA.—The County Commissioners of King William County will build a bridge over the Pamunkey River at New Castle.

LACONIA, N. H.—The City Council will probably decide to build either a steel or iron bridge over the river at Mill St. James McLoughlin, Chairman, can probably give some information.

MILLFORD, CONN.—Press reports state that the Millford Electric Railroad Co. will build an iron bridge in Millford.

OLEAN, N. Y.—A new highway bridge will be built in Olean.

POTTSVILLE, PA.—The Borough Council is considering the question of building a bridge over the railroad tracks at Centre St.

ROCHESTER, N. Y.—Contracts for building two bridges over the Erie Canal were awarded, one to the Rochester Bridge & Iron Works, the other to B. P. Smith, Rochester.

ST. JOSEPH, MO.—Plans are being prepared for a bridge to be built over the railroad tracks at South Sixth St.

SCRANTON, PA.—The Scranton Railway Co. in a proposed extension of its road will be required to build a bridge at North Park and Sunset Ave.

TOPEKA, KAN.—Press reports state that preparations are being made by the Chicago, Rock Island & Pacific to commence the work of building 20 new iron bridges on the line of the Western division between Phillipsburg and Colorado Springs. The bridges will all take the place of less substantial structures, and will be completed before the end of the year. The new bridges will vary in cost from \$3,000 to \$10,000.

WILLIAMSPORT, PA.—The Grand Jury recommends a bridge over Mill Creek, one mile south of Warrensville, to cost \$1,600, and a bridge over the west branch of Larry's Creek, in Cummings, at a cost not exceeding \$1,800. George L. Lynch, City Eng., can probably give some information.

WILLISTON, IND.—A bill has been introduced in the State Senate to authorize the building of a bridge over the Choptank River. Mr. E. R. Goslin, Federalburg, president of Caroline County Board of Commissioners, can probably give information about this bridge.

RAILROAD LAW—RECENT DECISIONS.

The Indiana statute which requires enginemen to ring and whistle at crossings is held to be intended solely for the protection of persons and animals approaching a crossing. Failure to comply with this statute will therefore not charge a railroad company with any negligence where it runs over a child at a considerable distance from a crossing, even in a case where, if the required signals had been given the child's parents might have saved it. The court also holds that a railroad company is required to fence only against live stock, not against children (decided by the Appellate Court, February, 1898).

In a proceeding brought in Maine, it appeared that the public had, by long use of a road that crossed a railroad, acquired a right of way over the track at the point of crossing. A highway was subsequently formally located along the line of this road by due proceeding of the County Commissioners. The town in which this highway existed appears never to have done anything to maintain or repair it, the public continuing to use it as they had done before it was so located, and it was, after a few years, formally discontinued by the Commissioners. On this state of facts it is held that the right of the public to cross the track at the point mentioned was lost, as their prescriptive right to use the road, acquired by lapse of time, had been merged and extinguished as such in its new right to use it as a highway, and that this latter right was destroyed when the highway was discontinued (decided by the Supreme Court, December, 1897). The corollary necessarily following the conclusion of the Court in this case, that a property right can be taken away without compensation by act of a board of highway commissioners, is so novel that it may be found interesting to read the ingenious opinion in full, notwithstanding its somewhat technical character.

As a general rule the common law of Iowa makes a railroad company absolutely liable to pay for any injury to property intrusted to it as a carrier, in the absence of a contract limiting such liability, and, furthermore, a statute of that State declares such

a contract to be invalid and unenforceable, as being against public policy. It is held that this statute does not apply to a contract whereby a shipper of live-stock assumes the duty of attending to, feeding and watering the stock, while on the road, at his own risk, and actually accompanies it for that purpose. The company must furnish proper facilities for the exercise of such care, and if this is done the shipper cannot recover for any injury to the stock arising from lack of care, and the burden is upon him to prove a failure on the part of the company to furnish proper facilities (decided by the Supreme Court, February, 1898).¹ The court seems to base its decision on the ground that the stock is not exclusively intrusted to the carrier, but, on the contrary, does not leave the custody of the shipper for the purposes enumerated in the contract.

It is decided in Texas that a person who is given a railroad pass to accompany live-stock for the purpose of taking charge of them is, as a matter of fact, a passenger and not an employee, even though he agrees to be deemed an employee of the company during the passage, and to assume all the risk of the employment. In such a case, therefore, a railroad company, if sued by the passenger for damages in compensation for personal injuries, cannot in its defense avail itself of the rule of law which exempts a master from liability to one of its servants for an injury received through the negligent act of a fellow servant (decided in the Court of Appeals, January, 1898).²

In the same State, in an action brought against a railroad company to recover the value of certain growing trees alleged to have been destroyed by fire started from one of its engines, it is held that, inasmuch as a statute of Texas provides that suits for the recovery of lands, or for damages thereto, must be brought in the county where such lands lie, and as growing trees are "lands" within the application of the statute, a court of no other county has jurisdiction of the action, although the same statute also contains a general provision that suits against a railroad company may be brought in any county into which its road extends (decided by the Court of Appeals, January, 1898).³

In Kentucky a railroad company is held to be under no obligation, as a general rule, to delay starting its train until a passenger has taken his seat or had sufficient time in which to do so. The court strongly intimates, however, that the contrary is true where there is some special reason for the exercise of more care in this respect, which is brought to the notice of the company, as for example in the case of a weak, lame or otherwise infirm person, or of a passenger on the platform. In this case the plaintiff was a heavy woman of middle age and, at the time of the injury complained of, was in charge of six small children, and carried a basket. The court sets aside a verdict in her favor (decided by the Court of Appeals, January, 1898).⁴

It is held in Texas that a contract made by a railroad company to transport goods from a foreign port to a point in the United States, for a through freight rate of which the proportionate part from the port of entry to the point of destination (that is to say, the share of the railroad company connecting with the ship) is less than the rate regularly charged for freight starting at such port of entry, and carried to such destination, does not necessarily violate the Interstate Commerce Law, by conflicting with the section thereof which provides that no carrier, subject to the provisions of the act, shall demand or receive "from any person or persons a greater or less compensation for any service . . . in the transportation of passengers or property . . . then it demands or receives from any other person or persons, for doing for him or them a like . . . service . . . under substantially similar circumstances and conditions." The court further holds that a carrier seeking to avoid such a contract on the ground that it contravenes the Interstate Commerce Law must show, not merely that it may have been unlawful, but that it was necessarily so (decided by the Court of Appeals, December, 1897).⁵ This decision is based upon a leading case decided in 1896 by the United States Supreme Court.⁶ On the point raised here the court there held, to quote a subdivision of the head note: "In determining questions of the reasonableness of rates and of discrimination in respect to traffic originating in foreign countries, the Commission and the courts may and should take into consideration, as constituting dissimilar conditions, circumstances existing beyond the seaboard of the United States (such as competition by ocean freights), as well as conditions prevailing within the United States." Three justices dissented from the conclusion of the court on this branch of the case.

The Federal Court has reasserted the doctrine that negligence on the part of a plaintiff, contributing to an injury, must be proved by the defendant, and holds that in the absence of such proof it will be presumed that there was no such negligence (decided by the C. C. A. Sixth Cir., January, 1898).⁷ There is much diversity of opinion on this point. The United States Supreme Court, the Federal Courts generally, the English Courts and the courts of Kansas, Maryland, Minnesota, Missouri, New Hampshire, New Jersey, Rhode Island, South Carolina, Texas, Wisconsin, Colorado and Washington follow the rule above stated. On the contrary the rule in New York, Massachusetts, Maine, Connecticut, Mississippi, Georgia, North Carolina, Michigan, Illinois and Iowa, puts upon the plaintiff the burden of affirmatively proving his freedom from contributory negligence. Otherwise he cannot recover.

1. Baltimore & O. S. W. vs. Bradford, 49 N. E., 388.
2. In re R. Crossing, 39 Atl., 478.
3. Grieve vs. Ill. Cent., 74 N. W., 182.
4. St. L. S. W. vs. Nelson, 44 S. W., 179.
5. G. C. & S. F. vs. Foster et al., 44 S. W., 198.
6. Louisville & N. vs. Hale, 44 S. W., 213.
7. Southern Pac. vs. Redding, 43 S. W., 1061.
8. Texas & P. vs. Interstate C. C., 162 U. S., 197.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chicago, Milwaukee & St. Paul.—Common extra $\frac{1}{2}$, regular 2 per cent., preferred $3\frac{1}{2}$ per cent., payable April 19.
Cleveland, Cincinnati, Chicago & St. Louis.—Preferred, quarterly, $\frac{1}{4}$ per cent., payable April 20.
Manhattan.—Quarterly, 1 per cent., payable April 1.
New York Central & Hudson River.—Quarterly, 1 per cent., payable April 15.
New York & Harlem.—Common and preferred, 2 per cent., payable April 1.

Pittsburg, Youngstown & Ashtabula.—Common, 3 per cent., preferred $3\frac{1}{2}$ per cent., payable March 25.
Sunbury & Lewiston.—Four per cent., payable April 4.
New York, New Haven & Hartford.—Quarterly, 2 per cent., payable March 31.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 7137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car Builders' Association.—Saratoga Springs, N. Y., Wednesday, June 8.

Master Mechanics' Association.—Saratoga Springs, N. Y., Monday, June 13.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1,533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

Engineers' Club of Chicago.

At a meeting of the Engineers' Club of Chicago Friday evening, March 11, Col. E. D. Meier of St. Louis presented a paper entitled "The Diesel Motor." The Diesel motor is a form of gas or petroleum engine recently brought out in Germany, for which many claims are made. Col. Meier is the agent for the Diesel Company in this country.

The Civil Engineers' Club of Cleveland.

The annual meeting of the Club was held at Cleveland March 8, President Ritchie in the chair. The annual report of the Executive Board showed a gain of 29 in membership for the year and a loss of 20, making a net gain of 9 members. The present membership is composed of 149 active, 32 associate, 14 corresponding and 5 honorary members, a total of 190. The resident members number 165, and the non-resident 25. Fifteen meetings have been held during the year, with a total attendance of 524 members and 86 visitors.

The report of the Secretary showed that receipts charged to the general fund amount to \$1,598.44, and disbursements, \$1,803.92. Receipts charged to library fund amount to \$120, disbursements, \$114.26. The permanent fund has a balance of \$722.90.

The following officers were elected: President, Frank C. Osborn; Vice-President, Samuel T. Wellman; Secretary, William H. Searles; Treasurer,

Walter Miller; Librarian, William E. Reed; Directors to serve one year, Joseph R. Oldham and Samuel T. Dodd; Directors to serve two years, Ralph A. Harman and Charles W. Hopkinson.

President Ritchie made an informal address upon the state of the Club, referring to those members who have died during the past year. He called attention to the Lorain & Cleveland Electric Railway, recently completed, which he described as being very well built and equipped, and which is operated at high speed, making a distance of 19 miles in 28 minutes, including stops. The remainder of his remarks were devoted to a description of the new ship yard at Lorain, built for the Cleveland Ship Building Company. He exhibited tracings of the plan of the yard and dry dock, and of the principal buildings, and described these severally, giving many interesting items.

At the close of his address Mr. Oldham remarked that this ship yard is doubtless the most efficient in the world. Many old ship yards had grown by additions, while this yard is one complete design.

The President stated that it is the intention of the company to extend an invitation to the Club to visit this ship yard on the occasion of the launch of the first vessel completed there, which would probably take place in the month of April.

The St. Louis Railway Club.

At the February meeting of the St. Louis Railway Club the principal discussion was upon English railroad practice. Dr. William Taussig, formerly President of the Terminal Railroad Association of St. Louis, gave a description of the London railroad clearing house, using the material of his paper before the Commercial Club, which was published in the Railroad Gazette of May 22 and 29, 1896. After describing the English institution Dr. Taussig took up the question whether a clearing house would be practicable and useful in this country. He was fully satisfied that it would. The Southern Railway & Steamship Association, under Mr. Fink, though formed chiefly for maintaining rates and pooling receipts, also had a clearing house for traffic accounts, and it was successful until the organizer, Mr. Fink, left the Association. The former Southwestern Railway (so-called Gould) System, comprising the Wabash, the Missouri Pacific, the Iron Mountain, the Texas & Pacific, and other lines, operated a clearing house, under the able management of its then Auditor, Mr. Warner, now Vice-President of the Missouri Pacific, for the entire system, successfully for several years and until its disintegration, a few years ago. The disintegrated roads employ now over 2,000 clerks to do the work that 600 clerks performed while the clearing for all was in effect.

Again, the fast freight lines with which we are all familiar, virtually have clearing houses for car service accounts. Dr. Taussig thought that a clearing house would be of great value in St. Louis, where the railroads now transfer from one to another several hundred thousand dollars weekly. There are thirteen roads terminating in East St. Louis and nine in St. Louis, the Terminal Railroad Association, the Wiggins Ferry Company and the St. Louis Transfer Company being the intermediaries. Each one of the nine roads on the west side deliver freight to each one of the thirteen on the east side, and vice versa. Each has charges against the other, and each of the twenty-one roads makes its collection from the other twenty, employing a small army of collectors, cashiers and entry clerks. Cross transactions of thousands of dollars could be settled by payment of balances of a few dollars. Dr. Taussig endeavored to bring about a clearing house, where one manager and a clerk could transact this whole business in one hour, daily. The only obstacle is the undue feeling of independence on the part of each road and distrust of one another. This country is too large for a single clearing house, but it could be easily divided into groups. Two conditions are essential. First, incorporation by act of Congress, with power to enforce compliance with signed agreements and conditions. Second, the force of moral conviction on the part of the owners of the lines that such a corporation will conduce to healthy conditions and to harmony of interests.

Mr. George B. Leighton spoke on English signal practice. Discussing the differences between English and American practice he said:

"In England the automatic block signal as we know it is not at all known. The universal block signal system is virtually a telegraph block, wherein the signals are controlled manually. Electric bells are used to announce the character of trains. Only in a few instances is the Sykes, or rail circuit, in use. In other words, as a general statement there is no absolute prevention of a block signalman giving a wrong signal to a train, but care and attention. In interlocking there are few, if any, rail circuits in use for controlling levers. The use of derrails is prevalent, oftentimes with short running spaces. The distant signal is used as the controlling signal in much, if not all, of English practice, and the white light has been abandoned. An exhaustive study on English signal practice was given by Mr. F. A. Delano, in October, 1894.* I believe there is very little, if anything, in English signaling that can be adopted with advantage by us, excepting the abandonment of the white light for the use of red and green only. Owing to the prevalence of heavy fogs in England, there are several forms of signaling for indicating to a man standing at the foot of a mast the position of the signals."

PERSONAL.

—Mr. Charles L. Davidson, Chairman of the Board of Railroad Commissioners of Iowa, died of apoplexy at his home at Hull, Ia., March 15.

—Mr. Samuel H. Church, of Pittsburgh, Assistant Secretary of the Pennsylvania Company, was married on Tuesday afternoon, March 15, to Miss Bertha Jean Reinhart, daughter of James McH. Reinhart, of Pittsburgh.

—Mr. James Pierson Argersinger, Director and Vice-President of the Fonda, Johnstown & Gloversville, with headquarters at Gloversville, N. Y., died at his home in Johnstown, N. Y., March 11, at the age of 64. Mr. Argersinger was also Vice-President of the People's bank of Johnstown.

—Mr. William Hacker, at one time Auditor of the canal and coal companies controlled by the Pennsylv-

*Published in full in the Railroad Gazette, November 30, 1894.

vania Railroad, died at his home in Germantown, Pa., March 11, at the age of 64. Mr. Hacker was also at one time a Director of the Provident Life & Trust Co. and the National Bank of the Republic, both of Philadelphia.

—Mr. Arthur Johnson, formerly with the Johnson and the Hall Railroad Signal Companies, and with the Erie Railroad, but for the last two years connected with the signal works of Mr. W. R. Sykes, London, England, has been appointed Electrical and Signal Engineer for the Government Railroads of New Zealand, with headquarters at Wellington. Mr. Johnson and his wife left New York this week for San Francisco on their way to their new home.

—Mr. Bucher Ayres, at one time Superintendent of the Memphis & Charleston, which was recently sold to the Southern, died at his home in Philadelphia, Pa., March 12. Mr. Ayres graduated from Dickinson College, and afterwards was a Civil Engineer of the Pennsylvania State Engineering Corps on the Gettysburg Railroad, now the Western Maryland. In 1846 he engaged in the iron manufacturing business at the Brookland Iron Works, Pa., and afterwards was for three years to 1852 in charge of the train service of a section of the Pennsylvania Railroad. In 1854 Mr. Ayres was appointed Superintendent of the Memphis & Charleston, and later served on the staff of Gov. William F. Johnson of Pennsylvania as Lieutenant Colonel.

—William Starke Rosecrans, Brevet Major-General U. S. A., M. Am. Soc. C. E., died at his home in California on the morning of March 11. He was born in Ohio Sept. 6, 1819, and graduated from West Point in 1842 and entered the Corps of Engineers. He was about four years at the Military Academy as Assistant Professor and served on river and harbor work with the corps for some years, and resigned in 1854 to go into business as an architect and civil engineer. He served during the civil war from the very beginning until the end, having reached the rank of Major-General of Volunteers, and he resigned from the regular army in 1867 with the rank of Brevet Major-General. He served as a Minister to Mexico, as a Member of Congress from California, and, from 1885 to 1893, as Registrar of the United States Treasury.

—Mr. J. T. Whittlesey has resigned as Chief Engineer of the Brooklyn Heights Railroad Co., to accept a position with the John Stephenson Co., the car builders. The track and electrical engineering departments of the Brooklyn Heights have been consolidated and Mr. J. C. Brackenridge has been appointed Chief Engineer in charge of construction and maintenance of track, overhead line work, power houses, repair shops, car equipment and buildings. He will be assisted by Mr. R. P. Brown, as Electrical and Assistant Chief Engineer. Mr. Brackenridge was Assistant Engineer in charge of foundation construction and track work during the building of the Brooklyn and Union Elevated Railroads of Brooklyn, from 1884 to 1889. He was for a short time Assistant Engineer on the water-works extension east of building electrical subways above Fifty-ninth street, New York City, and later went with the Department of City Works of Brooklyn as Assistant Engineer of the water-works extension east of Rockville Center, L. I. His last position was Chief Engineer of the track department of the Brooklyn Heights and Brooklyn, Queens County & Suburban Railroad companies, and while in this position he acted as Engineer of the associated trolley companies of Brooklyn, comprising all electrical surface railroads in the city of Brooklyn, for the purpose of extending the lines across the New York & Brooklyn Bridge.

ELECTIONS AND APPOINTMENTS.

Alexandria, Woodworth & Beaumont.—The officers of this company, which includes the Alden Bridge & Camden, Kingston & Choctaw Valley and the Klanich River Railways, are as follows: President, R. A. Long, Kansas City, Mo.; General Manager, C. J. Mansfield, St. Louis, Mo.; General Freight Agent, W. G. Mitchell.

Aransas Harbor Terminal.—Chief Engineer William Dunbar Jenkins has moved his office from Tarpon, Tex., to Aransas Pass, Tex. The change was made March 5.

Atlanta & Charlotte.—At the annual meeting of the stockholders of the Atlanta & Charlotte, which is leased to the Southern, held in New York City March 9, George B. Canfield was elected Director, succeeding the late R. H. Rochester.

Atlantic & North Carolina.—At the annual meeting held at Raleigh, N. C., March 8, no successor was elected, by request of Gov. Russell of North Carolina, to succeed Robert Hancock as President of the Atlantic & North Carolina.

Baltimore & Ohio Southwestern.—C. H. Grace has been appointed Superintendent of Telegraph, with office at Cincinnati, O., succeeding Horace Johnson, who has been appointed Chief Electrician.

Beaumont Wharf & Terminal.—The officers of this company are as follows: President, W. S. Davidson; Vice-President and General Manager, W. W. Willson; Chief Engineer, James F. Weed; General Superintendent, H. O. Cowles; Master Mechanic, E. A. Campbell, all of Beaumont, Tex.

Bellingham Bay & British Columbia.—A. Brannin, heretofore Assistant Superintendent, with headquarters at New Whatcom, Wash., has resigned. He will be succeeded by W. H. Lawson, heretofore Cashier of the Bellingham Bay Improvement Company. Mr. Lawson will have his headquarters at New Whatcom, Wash.

Cane Belt.—The officers of this company, referred to in Construction column, are as follows: President, William Dunovant, Houston, Tex.; Vice-President and General Manager, W. T. Eldridge, Eagle Lake, Tex.; Secretary and Treasurer, Thomas F. Boulden, Eagle Lake, Tex. The general office is at Eagle Lake.

Chicago, Burlington & Quincy.—George Hargreaves has resigned his office as Purchasing Agent, with office in Chicago, Ill. Mr. Hargreaves has been appointed Vice-President of the Michigan Peninsular Car Company of Detroit, Mich. The resignation is to take effect April 1.

Dr. J. W. Leonard, heretofore Medical Examiner,

has been promoted to the position of Chief Surgeon, and hereafter will have his office in St. Joseph, Mo. Dr. J. D. Smith has been appointed Consulting Surgeon, and J. W. Ferguson, heretofore of Hannibal, Mo., has been appointed Medical Examiner, succeeding Dr. Leonard. Offices have been opened in the Commercial Block, St. Joseph, Mo.

Choctaw, Oklahoma & Gulf.—James Cunningham, Master Mechanic, has transferred his office from South McAllister, I. T., to Shawnee, I. T.

Colorado Valley.—The stockholders at their annual meeting held at Sweetwater, Tex., March 2, elected the following directors for the ensuing year: Irving Wheatcroft, London, England; Warren Reed, Dallas, Tex.; S. T. Foster, St. Louis, Mo.; R. W. Andrews, San Antonio, Tex.; J. H. Burroughs, Robert Lee, Tex.; D. S. Arnold, Sweetwater, Tex.; George G. Moore, Burton-on-Trent, England; C. B. Holmes, New York, and L. B. Murray of Robert Lee, Tex. At a meeting of the directors, held the same day, the following officers were elected: President, C. B. Holmes; Vice-President and General Manager, Irving Wheatcroft; Secretary, D. S. Arnold; Treasurer, J. H. Burroughs; Chief Engineer, George G. Moore. The general office is at Sweetwater, Tex.

Columbia & Western.—At the meeting of the stockholders of this company, which was recently sold to the Canadian Pacific, held in Montreal, Que., March 11, the following new directors were elected: T. G. Shaughnessy, R. B. Angus of Montreal; George McL. Brown, Harry Abbott and Richard Marpole of Vancouver. At a meeting of the directors held later, T. G. Shaughnessy, Vice-President of the Canadian Pacific, was elected President of the Columbia & Western, and W. H. Campbell Oswald Secretary.

Current River Railroad.—At the annual meeting of this company, which is a part of the Kansas City, Fort Scott & Memphis, held in Kansas City, Mo., March 9, P. D. Ridenour of Kansas City was elected Director succeeding J. P. Dana.

El Paso & Northeastern.—The officers of this company are as follows: President, Charles B. Eddy, 66 Broadway, New York City; Vice-President, C. D. Simpson, Scranton, Pa.; Secretary, B. S. Harmon, Scranton, Pa.; Treasurer, H. P. Simpson, Scranton, Pa.; Auditor, H. A. Conner; General Manager, J. A. Eddy; Superintendent in charge of Traffic, W. C. Hollister; Chief Engineer, J. L. Campbell; Master Mechanic, George F. Miller, all of El Paso, Tex. A. S. Greig, heretofore Trainmaster of the Santa Fe, Prescott & Phoenix, has been appointed Superintendent of the El Paso & Northeastern.

Eureka & Klamath River.—The officers of this company are as follows: President and General Manager, E. H. Vance; Vice-President, S. A. Vance; Secretary, H. W. Wandesforde; Superintendent, Nelson Young; Chief Engineer, J. N. Lentell. The offices of all are at Eureka, Cal.

Findlay, Fort Wayne & Western.—Frank Finney has been appointed General Freight and Passenger Agent, succeeding Frank Jones, resigned. Mr. Finney was formerly connected with the Cleveland, Cincinnati, Chicago & St. Louis Freight Department at Indianapolis. (See this column for March 4.)

Florida, Alabama & Northern.—The officers of this company are as follows: President, W. B. Wright, Pensacola, Fla.; Vice-President, J. E. Hughes, Florida, Ala.; Secretary, J. B. Perrong, Florida, Ala.; Treasurer, J. S. Reese, Pensacola, Fla.; General Freight and Passenger Agent, E. E. Reese, Laurel Hill, Fla.

Fort Worth & Denver City.—At the annual meeting, recently held in Fort Worth, Tex., Col. Morgan Jones, heretofore Vice-President, was elected Vice-President and General Manager.

Galeton, South Branch & Germania.—C. H. Rexford of Gaines, Pa., is President of the company, and J. L. Snyder of Leontonia, Pa., is Vice-President; the Secretary and General Manager is C. H. Rexford, Jr., Galeton, Pa.; Treasurer, J. T. Dingle, Westfield, Pa.; General Manager, W. A. Rexford, Galeton, Pa.

Galveston, Harrisburg & San Antonio.—B. C. Cushman has been appointed Treasurer of the Galveston, Harrisburg & San Antonio and the Texas & New Orleans, succeeding Paul Flato.

Great Northern.—F. E. Ward, heretofore Assistant to President J. J. Hill, has been appointed General Superintendent of the Montana Central, with headquarters at Great Falls, Mont., succeeding G. R. Martin, who has been appointed Assistant General Superintendent of the new division between Grand Forks and Blackfoot, with headquarters at Larimore, N. D. J. M. Gruber, formerly Superintendent of the Montana Central, will have charge of the division from St. Paul to Grand Forks, and R. W. Bryan will have charge of the Western Division from Blackfoot to the Pacific Coast, and will have his headquarters at Spokane, Wash.

F. H. Brittain, heretofore Superintendent of the Fergus Falls Division, has been appointed Assistant General Superintendent of the Western District, with headquarters at Spokane, Wash., succeeding R. W. Bryan, transferred.

Gulf, Louisiana & Great Northern.—The new officers of this company are: Vice-President, A. L. Atkins, Arcadia, La.; Treasurer, H. D. Branch, St. Joseph, Mo., and Auditor, C. H. Teal, Colfax, La.

Hartwell.—The officers of this company, referred to in the General Railroad News column, are as follows: A. B. Andrews, Raleigh, N. C., President; J. S. B. Thompson, Sanders McDaniel, Atlanta, Ga.; W. F. Bowers, Canon, Ga.; E. V. Benson, Hartwell, Ga.

Illinois Central.—Thomas S. Leake has been appointed Master Carpenter, with headquarters at Chicago, Ill., succeeding George F. Jenkins, resigned. The appointment is also effective on the Yazoo & Mississippi Valley.

Dwight C. Morgan has resigned as Assistant Engineer, with office in Chicago, Ill. Mr. Morgan was appointed Assistant Engineer last August, succeeding David Sloane, who was then appointed Acting Chief Engineer.

Jasper Southern.—The new officers of this company are as follows: President, W. J. B. Adams; Sec-

tary, L. P. Scarborough; Treasurer, E. A. Seale; Chief Engineer, W. W. Blake, all of Jasper, Tex.

Kansas City, Clinton & Southern.—At the annual meeting of this company, which is a part of the Kansas City, Fort Scott & Memphis, held at Kansas City, Mo., March 9, J. K. Burnham of Kansas City was elected Director, succeeding S. F. Felton of Kansas City. One vacancy remains on the Board.

Kansas City, Pittsburgh & Gulf.—W. A. Williams, Superintendent of the Northern Division, with headquarters at Pittsburgh, Kan., has resigned to become General Superintendent of the Omaha, Kansas City & Eastern and the Omaha & St. Louis, with headquarters at Quincy, Ill.

Lake Shore & Michigan Southern.—Henry C. Jewett, heretofore Soliciting Freight Agent, has been appointed Traveling Freight Agent for the territory west of Toledo, O., with office at that place. W. C. Keller, heretofore in charge of the territory west of Toledo, will have charge of that territory on and south of the Lake Shore & Michigan Southern in Toledo.

C. H. Houghton has been appointed Traveling Engineer of the Toledo Division, succeeding the late John Carter. He will have his office in Toledo O.

Leavenworth, Kansas & Western.—B. R. Bradow of Leavenworth, Kan., has been appointed Master Mechanic. His office will be at Leavenworth, Kan.

Lebanon, Sodaville & Waterloo.—M. W. Wilkins of Waterloo, Ore., is President and General Manager, and A. H. Freerksen of Albany, Ore., is Secretary.

Lehigh & New England.—S. S. Vandruiff has resigned as Superintendent with office at Deckertown, N. Y.

Lehigh Valley.—President Alfred Walter has removed his home to South Bethlehem, Pa., and hereafter will have offices in South Bethlehem, Pa., Philadelphia and New York.

C. A. Parker has been appointed Northwestern Passenger Agent, with headquarters in Chicago. He will be succeeded as Traveling Passenger Agent by J. A. S. Reed, with headquarters in New York.

Mississippi River, Hamburg & Western.—A. M. Gibson has been appointed Chief Engineer, with headquarters at Portland, Ark.

Missouri, Kansas & Texas.—D. S. Willard, heretofore Auditor of the Missouri, Kansas & Texas Railway Company of Texas, with office at Dallas, Tex., has resigned. William O'Connell, heretofore Auditor of Receipts of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed Auditor, succeeding Mr. Willard. W. L. Seelig has succeeded Mr. O'Connell as Auditor of Receipts. His office will be in St. Louis, Mo.

Mobile & Ohio.—J. G. Mann, heretofore General Manager, was recently elected Chief Engineer. He will continue to have his office in Mobile, Ala. R. Carroll, recently elected Vice-President, was also elected General Manager.

Montfort Colonization Ry.—At the annual meeting held in Montreal, Que., D. W. Brunet, heretofore Manager, was elected Assistant Secretary and Treasurer.

Montpelier & Wells River.—F. S. Anable has been appointed General Auditor, with office at 53 State St., Boston, Mass. He will have supervision over all matters pertaining to the accounting department, and the Auditor will report to him.

National Despatch.—George Pepall, Local Agent of the Grand Trunk Freight Department in Toronto, has been appointed General Canadian Agent of the National Despatch, with headquarters in Toronto.

New York Central & Hudson River.—A. S. Weston, Assistant Engineer at Syracuse, N. Y., has been appointed Inspector of Masonry for the Rome, Watertown & Ogdensburg division, and will have his headquarters at Watertown, N. Y.

Norfolk & Western.—C. H. Kingsbury, heretofore Soliciting Freight Agent, with headquarters at Chicago, has been appointed Traveling Freight Agent, with headquarters at Columbus, reporting to J. R. Ruffin, Division Freight Agent at Columbus.

Northern Pacific.—C. W. Mott, General Emigration Agent, with office at St. Paul, Minn., has resigned and the office has been abolished.

Pacific Express Company.—At the adjourned annual meeting of the stockholders held in Omaha, Neb., March 9, directors were elected as follows, for the ensuing year: H. G. Burt, E. B. Pryor, S. S. Schuyler, E. C. Merriam, E. T. Clapp, E. M. Morseman and O. W. Mink. At a meeting of the directors held immediately afterward the following officers were elected: E. M. Morseman, President; C. W. Mink, Vice-President; W. R. Carter, Treasurer and Secretary, and Erastus Young, General Auditor. The only change made in the directory was the election of Horace G. Burt, President of the reorganized Union Pacific Railroad Company, to succeed E. Ellery Anderson, who, as receiver, formerly represented the Union Pacific on the Board of Directors.

Peoria & Pekin Union.—At the annual election held at Peoria, Ill., March 8, George L. Bradbury, Vice-President and General Manager of the Lake Erie & Western, was elected President and General Manager of the Peoria & Pekin Union. C. H. Bosworth was elected Vice-President and General Superintendent, with office at Peoria, Ill.

Philadelphia, Wilmington & Baltimore.—E. A. Richardson, heretofore Steam-Heat Inspector of the Pennsylvania Railroad, with headquarters at Altoona, Pa., has been appointed Foreman of Passenger Car Inspectors, with office at Washington, D. C., succeeding Jacob Denny, resigned. J. R. Alexander has been appointed Steam-Heat Inspector in addition to his present duties as Inspector of Air Brakes.

Pickens.—The officers of this company are: President and General Manager, Julius E. Boggs; Secretary, J. P. Carey; Treasurer and Auditor, J. McD. Bruce, and Chief Engineer, J. P. Lee, all of Pickens, S. C.

Pittsburgh, Lake Erie & Western.—A. E. Brownlee, heretofore a detective for the company, has been appointed Chief of the Detective force, succeeding the late C. W. Cook. He will have his office in Pittsburgh, Pa.

Portland, Vancouver & Yakima.—The officers of this company are as follows: President, Louis Gerlinger; Secretary and Treasurer, George T. Gerlinger; Auditor, Louis Gerlinger, Jr.; General Manager, Thomas H. Hubbard; Chief Engineer, J. E. Covert; General Freight and Passenger Agent, Napoleon Dion; Foreman of Locomotive Repairs, Thomas Bennett; Foreman of Car Repairs, Robert Rhodes; Road Master, J. H. McQuaid, all of Vancouver, Wash. Robert Smith is Superintendent of Bridges and Buildings, with office at Portland, Ore.

Queen & Crescent.—W. W. Bond, Superintendent of the Vicksburg, Shreveport & Pacific, and the Alabama & Vicksburg Divisions, has resigned. He will be succeeded by D. D. Curran, Superintendent of the New Orleans & Northeastern, the three divisions being consolidated. His headquarters will be at New Orleans, La.

Rio Grande Western.—A. W. Cowie, heretofore Superintendent of Telegraph, with office at Salt Lake City, Utah, has resigned. He will be succeeded by A. T. Miller, heretofore Chief Dispatcher at Salt Lake City.

St. Louis, Kennett & Southern.—F. S. Yantis has been appointed Auditor succeeding Theophilus Besel, with Office at Cape Girardeau, Mo. The appointment is also effective on the Chester, Perryville, Ste. Genevieve & Farmington.

Santa Fe Pacific.—Richard English, General Master Mechanic of the Santa Fe Pacific, which is a part of the Atchison, Topeka & Santa Fe, with office at Albuquerque, N. M., has resigned, resignation to take effect March 21.

Sea View.—The present officers of this road are: President, C. L. Rossiter, 168 Montague St., Brooklyn, N. Y.; Secretary and Treasurer, T. S. Williams, Brooklyn, N. Y.; Superintendent, William Finley, 968 Flatbush Ave., Brooklyn, N. Y.

Southern.—J. M. Turner, heretofore Commercial Agent of the Memphis & Charleston, which was recently sold to the Southern, and who was retained by the Southern as Commercial Agent at Memphis, has resigned his position to take service with the Norfolk & Western.

Southern Pacific.—James H. Alger of Ogden, Utah, has been appointed Superintendent of the Western Division, succeeding the late A. D. Wilder. His headquarters will be at Oakdale, Cal. John S. Noble, heretofore Superintendent of the Shasta Division, which has been merged into the Sacramento and Oregon Divisions, which are in charge of Superintendent J. B. Wright and Manager Richard Koehler, has been appointed as successor to Mr. Alger.

Staunton & Augusta.—C. L. Weaver is Chairman of the Board of Directors, and not President of the Board, as reported in this column for last week. His office is at Staunton, Va.

Tennessee Coal, Iron & Railway Company.—At the annual meeting of the stockholders held at Tracy City, Tenn., March 8, two new directors were elected. They are Benjamin F. Tracy and Elverson R. Chapman of New York, succeeding C. C. Baldwin and David Roberts.

Terminal Railway of Buffalo.—Miles Bronson, heretofore Private Secretary to President S. R. Callaway of the New York, Chicago & St. Louis, with office in Cleveland, O., has been appointed Superintendent of the Terminal Railway of Buffalo.

Terre Haute & Indianapolis.—William R. McKean, Jr., General Foreman of Locomotive and Car Shops at Terre Haute, Ind., has resigned.

Terre Haute, Olney & Chester.—At the recent annual meeting held at Olney, Ill., the following directors were elected: Russell B. Harrison, Terre Haute, Ind.; C. S. Muchmore, Oblong, Ill.; J. Q. Hitch, West Liberty, Ill.; Geo. W. Evans, Mt. Vernon, Ill.; Dr. W. M. Johnson, Johnsonville, Ill.; W. H. Cisne, Cisne, Ill.; Osman Henry, Wynoohe, Ill.; John N. Horner, T. A. Fritchey, S. C. Wilson, J. E. Wharf, R. N. Stoller, E. Murray, F. N. Boyer, of Olney, Ill., and E. C. Baughman of Zif, Ill. The officers of the company are: President, John N. Horner, Olney, Ill.; Vice-President, Russell B. Harrison, Terre Haute, Ind.; General Manager and Secretary, F. N. Boyer; Treasurer, R. N. Stoller, and General Solicitor, T. A. Fritchey of Olney, Ill.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

ABBEVILLE, PELZER & PIEDMONT.—A bill was approved Feb. 19 in South Carolina amending the charter of this road, granted Dec. 24, 1894, so that the route is to be from Abbeville Court House, S. C., a point on the Southern, north about 50 miles through Duwesset, Honepath, Belton, Williamston, Pelzer and Piedmont to Greenville. The incorporators are: Frank Hammond, J. L. Orr, E. A. Smythe, G. W. Sullivan, R. A. Lewis, C. E. Harper, A. S. Kennedy and W. C. McGowan.

BALTIMORE & OHIO.—This company has opened a new freight terminal with yard facilities at the foot of West 26th street on the Hudson River in New York City. Tracks were laid to accommodate 100 cars, and in addition a warehouse 300x25 feet was built.

BEAUMONT WHARF & TERMINAL.—Work has been begun, according to report, on this belt line at Beaumont, Tex. When completed it will have 8.5 miles of track. (Feb. 25, p. 148.)

BUFFALO, ROCHESTER & PITTSBURGH.—A. E. Patton of Curwensville, Pa., is reported to have obtained the contract for building the first 12 miles of the Allegheny & Western extension of this road from Punxsutawney, Pa., west 98 miles to New Castle, Pa. The Pennsylvania Construction Company of Curwensville has obtained a sub-contract from Mr. Patton. The company hopes to complete the road to Butler within eight months. This is to form part of the connecting line with the Lake Erie & Western, which is to be built from Akron, O., east 85 miles to New Castle. (Feb. 18, p. 130.)

CANE BELT.—This company was incorporated in Texas, March 8, with a capital stock of \$15,000, to build a line from Eagle Lake, a point in Colorado

County on the Southern Pacific, south 15 miles to Bonus, in Wharton County. The incorporators are: E. P. Newsome, Bonus; Wm. Dunovant, Houston; W. T. Eldridge, Thomas F. Boulden, J. W. Thatcher, Perry Clark, O. Green, Rudolph Greenbaum, William Jasper Magee, F. P. Herbert, Eagle Lake. The officers are given in another column.

CENTRAL CAROLINA.—An act was approved Feb. 19 incorporating this company in South Carolina, with a capital stock of \$500,000, to build a line from Augusta, Ga., northwest about 110 miles through Edgefield, S. C., Saluda, Greenwood or Newberry, to Greenville, S. C. The incorporators are: B. W. Crouch, M. P. Wells, J. A. Attaway, U. Crouch, J. D. Wills, Alin Etheredge, Eugene W. Able, T. S. Edwards, H. S. Cunningham, Eugene S. Blease, S. T. Boatwright, E. F. Etheredge, W. D. Berry, S. T. Edwards, W. S. Allen, A. S. Tompkins, W. H. White and Dr. Walter Ashley.

CHESTNUT RIDGE.—This road has been incorporated in Pennsylvania to build a line from Kunkletown through Milport and Little Gap and along the Chestnut and Stony Ridge Mountains to Lehigh Gap, a point on the Central of New Jersey. W. H. Booth of Kunkletown is to superintend the building.

CHICAGO, FORT MADISON & DES MOINES.—Surveys, according to report, have been begun for the proposed extension of this line northwest from Ottumwa, Ia., about 8 miles up the Des Moines River to Des Moines.

CHICAGO GREAT WESTERN.—Plans are under consideration for an extension of several miles of spur tracks in East Des Moines, Ia., to connect with various industries.

CHICAGO, ROCK ISLAND & TEXAS.—John F. Hughes is reported to have received a contract for grading 10 miles of the extension, referred to last week, from Bridgeport, Tex., west about 25 miles to Jacksboro.

CHICAGO TERMINAL TRANSFER.—An ordinance has been introduced into the Council at Chicago granting this company permission to extend its tracks from Montrose Boulevard to Franklin Park, and to connect with the Chicago & Northwestern.

CHOCTAW, OKLAHOMA & GULF.—Official statement is received that J. H. Maney & Co. have received a contract for building an extension of 25 miles west from Fort Reno, Okla., to Bridgeport and work has been begun. The company, as stated two weeks ago, is building an extension from Wister, I. T., east 6½ miles to connect with the Kansas City, Pittsburgh & Gulf.

DELAWARE & HUDSON.—Supreme Court Justice Kellogg of Plattsburgh, N. Y., has granted the application of the Adirondack Company's line of the Delaware & Hudson to condemn lands and extend its right of way from North Creek, N. Y., northwest about 60 miles to Tupper Lake. This extension has been under consideration by the Delaware & Hudson for some years, and when completed will form connection of the New York & Ottawa, which is being built between Tupper Lake and Ottawa, Ont. (Jan. 21, p. 50.)

DEMOPOLIS & PENSACOLA.—Work has already been begun, according to report, on this line projected to run from Pensacola, Fla., north through the counties of Santa Rosa, Fla., and Escambia, Monroe, Clark and Marengo, Ala., to Demopolis. John C. Webb of Demopolis is among the incorporators. (Feb. 18, p. 130.)

FRANKLIN, SOMERSET & KENNEBEC.—At a meeting of the stockholders at Farmington, Me., March 9, it was voted to empower the directors to issue bonds not to exceed \$8,000 per mile on the railroads built or contracted for. This line is to extend from Farmington, Me., south to tidewater, about 40 miles. The rails are reported to be ready for shipment at Johnstown, Pa. L. Atwood of Farmington is president. (Oct. 1, 1897, p. 696.)

GEORGIA PINE.—The extension of this road north from Damascus, Ga., to Arlington, according to report, has been completed and work will be begun at once on the extension from Bainbridge south to Tallahassee. Arthur Pew, Colquitt, Ga., is Chief Engineer. (Jan. 7, p. 17.)

IOWA CENTRAL.—L. M. Martin, General Manager, is reported to have stated that a branch of this road will be built during the coming summer from Oskaloosa, Ia., northwest about 25 miles to Des Moines. Intervening towns will be asked to subscribe as follows: Pella, \$30,000; Oskaloosa, \$5,000, and two other stations, each \$2,000, making \$39,000.

KANSAS CITY & NORTHERN CONNECTING.—The last rail has been laid, according to report, on this connecting link of the Kansas City, Pittsburgh & Gulf, from Kansas City, Mo., north 72½ miles, into Pattonsburg, Mo., where connection is made with the Quincy, Omaha & Kansas City line of the same system. The completed line of the Kansas City, Pittsburgh & Gulf is from Port Arthur, Tex., north through Kansas City and Pattonsburg to Omaha, Neb., on the west and Quincy, Ill., on the east. (Nov. 5, 1897, p. 790.)

KNOXVILLE & BRISTOL.—This company was incorporated in Tennessee, March 15, with a capital stock of \$1,000,000, to build a line from Knoxville northeast about 120 miles through Bean's Station on the Morristown & Cumberland Gap to Bristol, on the northern border of the State.

LITTLE ROCK & MEMPHIS.—Business men at Little Rock, Ark., held a meeting March 10 to organize a construction company to build a railroad from that city west about 150 miles to connect with the Choctaw, Oklahoma & Gulf at Wister Junction, I. T. According to the agreement, the city of Little Rock is to raise \$150,000, Memphis \$150,000, the Little Rock & Memphis Railroad \$300,000, and the Choctaw, Oklahoma & Gulf \$300,000. The road when completed will connect the Little Rock & Memphis at Little Rock with the Choctaw, Oklahoma & Gulf. The latter company is building an extension of 6½ miles eastward from Wister to connect with the Kansas City, Pittsburgh & Gulf. (March 4, p. 169.)

LOUISVILLE & SOUTHEASTERN.—Work will begin April 1, according to report, on the extension of this road (successor to the Richmond, Nicholasville, Irving & Beattyville), from Irvine, Ky., east 36

miles to Beattyville. This road was recently purchased by Adolph Segal of Philadelphia, and extends from Versailles southeast 61 miles to Irvine. (Jan. 21, p. 50.)

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—The report that this line is to be extended from Kulm, N. D., northwest about 110 miles to Bismarck, as stated by a contemporary, is officially declared to be incorrect. The company has not yet decided to make such an extension.

MISCELLANEOUS COMPANIES.—The Puget Sound Co. of Columbus was incorporated in Ohio, March 8, with a capital stock of \$10,000 to contract for the building and equipping of railroads, steamships and sailing vessels; to build docks, wharves and landings; to open coal, iron and other mines; to operate saw mills; to build houses and stores, and to take contracts for public and private improvements. Among the incorporators are: L. C. Leport, Charles A. Covert, H. O. Pond, E. Henderson and W. W. Hillis.

MUSQUODOBOIT.—A bill has been introduced into the House of Assembly at Nova Scotia to incorporate this company with a capital stock of \$1,000,000 to build a line from Windsor Junction, a point on the Inter-Colonial, east 40 miles to Parker's Corner, through the Musquodoboit Valley, with power to extend the road to Halifax or Dartmouth, and also eastward to such a point as may be authorized by the Governor. The work must be begun within two years, from the passage of the act. Among those interested are William Chisholm, Alexander Stephen and George L. Troop of Halifax; Arthur C. Johnstone, Edward M. Walker and James Simonds of Dartmouth.

NEW ROADS.—A road is being built from Tallokas, Ga., east 7 miles, to connect with the South Georgia. M. Brice of Tallokas, Ga., is building the road.

NORFOLK, VIRGINIA BEACH & SOUTHERN.—The roadbed is completed, according to report, and rails are laid for about two miles beyond Princess Anne Court House, Va., on the extension from Kempsville southeast 22 miles to Munden, a point on Currituck Sound. About 500 men are at work, and it is expected to reach the Sound by April 10. (Feb. 11, p. 110.)

NORTHERN PACIFIC.—Official statement is received that work is well under way on the extension of the Spokane & Palouse Branch from Pullman, Idaho, to Lewiston. Of this 40 miles was finished in 1891 and the company is now completing the remaining 20.6 miles. The contract was awarded to Geiger & Zabriskie of Tacoma, Wash., and it is expected that track will reach Lewiston early in June. (Feb. 4, p. 88.)

OHIO RIVER, ANDERSON & TIDEWATER.—A bill was approved Feb. 11 in South Carolina to incorporate this company as successor to the Western Carolina, which was incorporated Dec. 20, 1890. The company is to have a capital stock of \$300,000, with authority to build a line from some point on the Georgia state line on the Chattooga River southeast across the state via Anderson Court House to tidewater at Port Royal, with the privilege of extending branch lines from Anderson and other points on the main line northeast to Charleston and southwest in the direction of Savannah, Ga.

PEORIA & PEKIN UNION.—At the annual meeting held at Peoria, Ill., March 8, it was decided to make a number of improvements in the Peoria terminals of this belt line.

PICKENS.—Official statement is received that surveys will be completed in about a week on this road, which is proposed to extend from Pickens, S. C., east nine miles to Easley. The contract for grading track-laying, etc., has been let to W. J. Oliver, Langley, S. C. About one mile has been completed and 40 men are at work. There are no iron or steel bridges and the work is not difficult. Julius E. Bogg of Pickens is President. (Dec. 17, 1897, p. 898.)

PITTSBURGH & LAKE ERIE.—Official statement is received that the branch referred to in this column for March 4 is to run from Belle Vernon Pa., up Speer Run 1½ miles. Grading is now in progress. Contracts for grading, masonry, etc., have been let to Grady, Ceda & Co. The maximum grades are 1.2 per cent.; the maximum curves 12 degrees. About 100 men are at work.

QUEEN & CRESCENT.—An ordinance has been introduced into the Council at Natchez, Miss., granting the New Orleans & Northwestern line of the Queen & Crescent right of way for connection with the Yazoo & Mississippi Valley line of the Illinois Central in that city.

REYNOLDSVILLE & FALLS CREEK.—Grading was begun March 14, according to report, on a branch from Reynoldsville, Pa., to connect with the Jefferson & Clearfield Coal & Iron Co. Another extension is being made to the Maplewood lines at Rathmel. This road extends from Falls Creek, Pa., to Rathmel, 14.5 miles.

ROSENBERG, DAMON MOUND & GULF.—This company has been incorporated in Texas with a capital stock of \$200,000, to build a line from Rosenberg in Fort Bend County, south about 20 miles to Damon Mound, Brazoria County. The incorporators are: Noah Allen, John Owens, H. G. Niblo, William R. Stockwell, George B. Lang, R. T. Mulcahy and Joseph Billings.

SABINE TERMINAL RAILWAY & UNION DEPOT.—Official statement is received that no work has been done on this line beyond that described in this column for Nov. 26, except that of securing the right of way. This company proposes to build a terminal railroad at Sabine Pass, Tex., to connect deep-water wharves and slips with all the railroads in that city.

SAN ANTONIO & ARANSAS PASS.—This company is reported to have decided to build at an early date an extension from Alice, Tex., south about 150 miles to Brownsville, and may extend the line 250 miles further along the coast to Tampico, Mex.

SEABOARD AIR LINE.—The people of Logansville, Ga., and vicinity are proposing to build a line from Logansville northwest 10½ miles to Lawrenceville on the Seaboard Air Line, and the present indications are that the line will be built. The route has been surveyed and found to be entirely feasible. The grades are light, not exceeding 1 per cent., and

there are no serious complications in connection with the work. Not a steel nor iron bridge is necessary. Grading is expected to be done by the people themselves, under the direction of a civil engineer, who will look after the details and guide the work to a successful completion. It is probable that the road when built will be operated under the direction of the Seaboard Air Line. The people of Buford and Covington are considering the question of a further extension to their cities.

SIoux CITY, CHICAGO & BALTIMORE.—This company has established its general offices at Sioux City, Ia., where the engineers who have been making the surveys for the line are now located. The road is projected to run from Sioux City southeast 512 miles to St. Louis, Mo. L. F. Wakefield of Sioux City is Chief Engineer. (Feb. 25, p. 149.)

SOUTHERN PACIFIC.—This company, according to report, is considering the question of extending its line 55 miles to close the gap from Elwood, Cal., northwest to Surf, which would give a complete line near the coast from Santa Barbara to San Francisco.

TEXAS & PACIFIC.—Official statement is received that a contract was let March 5 to the Grigsby Construction Co. of Dallas, Tex., for grading and masonry on the proposed extension from Waskom, Tex., via Greenwood, La., to Reisor, La., 12½ miles. The maximum grade is 0.8 per cent. and the maximum curves 2 deg.

Electric Railroad Construction.

ANDERSON, IND.—Press reports state that the Union Traction Co. of Anderson is considering the proposition to build an electric line to Greenfield by way of Pendleton. It is doubtful, however, if such a road will be undertaken by this company in the near future as its electric road, from Anderson to Fairmount (Oct. 15, 1897, p. 737), is only now nearing completion. Among the officers of the company are Phillip Matter, Marion, Ind., president; John L. Forkner, Anderson, Ind., treasurer.

BALTIMORE, MD.—The Consolidated Railway Co. and the Baltimore County Agricultural Society are negotiating with a view to jointly building an electric railroad from Towson to Cokesville.

BOSTON, PA.—John C. McIntire & Co. of McKeesport have taken the contract to build the Youghiogheny Valley Electric Railroad from Boston to Buena Vista, a distance of five miles.

BROOKLYN, N. Y.—The State Railroad Commission granted the application of the Van Brunt Street & Erie Basin Railroad Company to change its motive power from horse to electricity.

BUCYRUS, O.—Press reports state that Mr. W. E. Haycox of Mansfield is interested in a proposed electric railroad to be built between Bucyrus and Gallon. This is probably the Buckeye Traction Co. (May 14, '97; p. 345.)

BUFFALO, N. Y.—U. L. Upson, General Manager, writes us regarding the Buffalo, Hamburg & Aurora Railway Co. (Oct. 5, Nov. 5, Dec. 24, '97; pp. 737, 791, 919): "We had intended to open our bids for the entire construction of 19½ miles of line, steam plant of 1,400 H. P., car barns, car sheds and 12 cars, at this office yesterday (March 8), but on account of the large number of contractors in New York and other Eastern cities requesting an extension of time, it was decided to open all bids at this office on March 30, at 10 a. m." The general offices of the company are at 1095 Ellicott Square.

CAMDEN, N. J.—The Camden & Suburban Railroad Co.'s extension between Collingswood and Haddonfield is now in operation.

CHARLESTON, S. C.—Concerning the Charleston & Seashore Railroad Co. (Dec. 31, 1897, p. 937) we learn that the company was incorporated recently by J. S. Lawrence, Philip H. Gadsden, W. W. Lawton and others of Charleston. The capital stock authorized is \$500,000. The company will build an electric railroad from Charleston through Christ Church Parish and Sullivan's Island and the towns of Mount Pleasant and Moultrieville to the Atlantic Ocean, on Long Island. A steel drawbridge will be built over the Cooper River.

CHATTANOOGA, TENN.—The Chattanooga Electric Railroad Co. will probably get a franchise for 10 years to operate cars on 6th and Broad Sts.

CORSICANA, TEX.—A franchise for building an electric railroad was recently granted by the Council of Corsicana. (Jan. 21; p. 51.)

DAYTON, O.—The Dayton & Easton Traction Co. (March 5, 1897, p. 177) will commence operation about April 15. Talk of extending the road to Richmond, Ind., is being revived.

EAST ST. LOUIS, ILL.—The St. Louis, Belleville & Suburban Railway Co. is now having its machinery erected and expects to be in operation by April 15. Our attention is called to the very low rate of fares which will be charged. From the Eads Bridge in East St. Louis to the Court House Square in Belleville, 14 miles, the fare will be 10 cents on commutation tickets, and 20 cents for a single trip.

JACKSON, O.—The Wellston & Jackson Railway Co. has made application to the City Council of Jackson for a franchise to build an electric railroad and to furnish lights to the city. Mr. M. S. Connors is interested in the company.

KANSAS CITY, MO.—The Brooklyn Avenue Railway Co., it is stated, will change its motive power to electricity. This company operates about 7 miles of track.

McKEESPORT, PA.—The Versailles Traction Co. has let a contract to John C. McIntyre & Co. of McKeesport for building an extension of its line.

MILWAUKEE, WIS.—Mr. A. C. Frost, representing a syndicate of Chicago capitalists, has asked the city Council for a franchise for an electric railroad. It is stated that his enterprise is being opposed by the Milwaukee & Waukesha Electric Railroad, and the Milwaukee Electric Railway & Light companies, who each seek the same franchise.

MINNEAPOLIS, MINN.—The Minneapolis & Anoka Electric Suburban Railroad Co. has been incorporated, with a capital stock of \$100,000, to build

an electric road. Among the incorporators are Henry Lee, I. A. Caswell and A. E. Giddings of Anoka. The road will be about 18 miles long.

NEW ORLEANS, LA.—The New Orleans & Jefferson Railway Co. (Jan. 14, p. 36) has commenced the work of building its railroad along Napoleon and Washington Aves. to the cemeteries and the lake resorts. N. C. Shepard and Messrs. Castleman and Zell are interested.

NEWPORT, R. I.—The Fall River & Stone Bridge and the Newport & Middletown street railroad companies have consolidated under the name of the Newport & Fall River Railway Co. Work of building the connecting road between Newport, R. I., and Fall River, Mass., will now be pushed forward. The following officers were elected: Stillman F. Kelley, Pres.; Boston; Philip L. Saltonstall, Treas.; Boston; A. C. Landers, Secy., Newport. A power house is now being built at Portsmouth. This project has been repeatedly mentioned in these columns.

OBION, TENN.—W. B. Southgate of Nashville, Tenn., has completed the survey and location of the Obion & Tiptonville Rapid Transit Co.'s electric railroad (Dec. 10, '97; Mar. 4, '98; pp. 879, 170), from Obion, Tenn., on the Illinois Central, to Glass, Hornbeak and the foot of Reelfoot Lake, a distance of 15 miles. The engineer will soon continue the survey across Lake County to Tiptonville, on the Mississippi River, a distance of 12 miles, making the total length of road from Obion to the terminal at Tiptonville 27 miles. The intention is to first build the road from Obion to Hornbeak, 9 miles, with money raised on subscription for stock made by the present owners and citizens along the line, after which the company expects to borrow money on first mortgage bonds to build the remaining distance. No contracts for grading have been let yet, the Chief Engineer not having completed his estimates. It will be a broad gage road and will haul both freight and passengers. No arrangements for power or other equipments. There will be over a mile of trestles in crossing the foot of the lake into Lake County. The officers are W. M. Wilson, President, Obion, Tenn.; T. J. Ogilvie, Secretary, Obion, Tenn.; J. H. McDowell, Treasurer, Union City, Tenn.

PRINCESS ANNE, MD.—A bill has been introduced in the Legislature to incorporate the Princess Anne & Deal's Island Light, Power & Railway Co., with a capital of \$40,000. The company will build an electric railroad about 20 miles long. The incorporators are: Thomas H. Brock, Wilmer O. Lankford, S. Frank Dashiell, Charles W. Mayman and H. Fillmore Lankford.

ROCKFORD, ILL.—The Rockford Railway, Light & Power Co. was recently incorporated with a capital of \$250,000. The incorporators are F. A. Poor, N. B. Poor and R. S. Clements.

ST. LOUIS, MO.—The Central Traction Co. has filed articles of incorporation; capital stock, \$100,000. The incorporators are: Finis E. Marshall, Cashier of the Continental National Bank; Lewis B. Tebbetts, Vice-President of the Mansur & Tebbetts Co.; John H. Blessing, stock broker, St. Louis; Julius S. Bache, banker, New York; H. Staples Potter, capitalist, Boston; R. M. Snyder, President of the Mechanics' Bank, Kansas City. Local papers state that this is a revival of the North and South railroad project, the promoters of which failed to get a franchise lately, owing to the Mayor's veto.

SARATOGA, N. Y.—The Saratoga Traction Co. has filed a certificate of extension with the Secretary of State for a proposed line passing through private lands in Saratoga Springs, thence along public highways to the towns of Malta and Ballston Spa.

SHENANDOAH, PA.—The Shenandoah Electric Street Railroad Company was reorganized by the election of Hamilton Godfrey of Reading, pres.; H. C. Geissner of Reading, vice-pres.; H. D. Rentschler, Ringtown, secy.; J. W. Johnson, Shenandoah, treas. This is a new electric railroad to connect Shenandoah with Ringtown and other towns in the Catawissa Valley, being a direct line over Locust Mountain. (Sept. 10, Oct. 22, 1897, pp. 641, 756.)

SYRACUSE, N. Y.—The Eastwood & East Syracuse Railroad Co. has been chartered to build an electric railroad from the village of Eastwood through De Witt, to East Syracuse. The capital stock is \$200,000, and the incorporators are: Alvin J. Belden, John A. Seely, C. M. Warner, G. E. Warner, Edward Joy, Albert P. Fowler, Frank J. Webb, M. C. Pierce, Clinton S. Carr, E. A. Simond, Alfred B. Worster, J. W. Black, J. Frank Plumb, C. E. Prunyn and Matthew Murphy, all of Syracuse.

The Syracuse, Skaneateles & Moravia Electric Railroad Co. (Nov. 12, 1897, p. 807, and in 1896), has made application to the Common Council for a franchise.

TORONTO, ONT.—Messrs. Clute, Macdonald, MacIntosh and McCrimmon can probably give some information regarding the Toronto Elevated Railway Company (unincorporated), which makes a proposition to the City Council to build an elevated railroad.

VALPARAISO, IND.—The Valparaiso, Flint Lake & Chicago Electric Railroad Co. has been formed with a capital of \$100,000, to build a road from Hammond to Valparaiso, a distance of about 25 miles. If such a road is built it will give, by junction with the Hammond, Whitney & East Chicago and the South Chicago City Railway, a continuous electric railroad to Chicago from Valparaiso, a distance of about 45 miles.

VICTORIA, B. C.—Among those interested in the Mountain Tramway & Electric Co. (Jan. 14, p. 35) are said to be Harry Abbot, R. Marpole, Vancouver, and Wm. Whyte, Winnipeg.

WATERBURY, CONN.—The Waterbury Traction Co. has petitioned the City Council for the right to make certain extensions within the city limits. It is stated that the company also plans to build an extension of its road to Watertown.

WORCESTER, MASS.—The Worcester Consolidated Street Railway Co. has petitioned the Railroad Commissioners for permission to extend its tracks from Worcester, through Millbury, to the town of Grafton. The Worcester, Oxford & Webster Street Railway Co. is a new company talked of to build a road from Worcester through Auburn, Oxford and Webster. The Legislature has been asked to extend the time in which the Millbury, Sutton & Douglass Railroad must be built.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

December 31:	1897.	1898.	Inc. or Dec.
Burlington, Cedar Rapids & Northern.			
12 months..... Gross	\$4,292,163	\$4,450,035	D. \$157,872
12 "..... Net	1,243,330	1,083,303	I. 160,027

January 31:	1898.	1897.	Inc. or Dec.
Illinois Central.			
1 month..... Gross	\$16,364,021	\$13,307,506	I. \$3,056,516
1 "..... Net	5,383,806	4,142,299	I. 1,241,507
7 months..... Gross	16,364,021	13,307,506	I. 3,056,516
7 "..... Net	5,383,806	4,142,299	I. 1,241,507

Louisville & Nashville.			
1 month..... Gross	\$1,807,684	\$1,602,516	I. \$205,168
1 "..... Net	627,905	493,783	I. 134,122
7 months..... Gross	12,881,498	12,195,433	I. 686,065
7 "..... Net	4,438,291	4,025,036	I. 413,255

Philadelphia & Erie.			
1 month..... Gross	\$253,128	\$254,857	D. \$1,729
1 "..... Net	8,405	35,214	D. 26,809

Rio Grande Western.			
1 month..... Gross	\$231,583	\$175,795	I. \$55,788
1 "..... Net	72,309	53,251	I. 19,058
7 months..... Gross	2,031,312	1,470,305	I. 561,007
7 "..... Net	765,652	493,691	I. 271,961

Union Pacific (Proper).			
1 month..... Gross	\$1,192,708	\$1,001,743	I. \$190,965
1 "..... Net	447,326	317,130	I. 130,196

Union Pacific (System).			
1 month..... Gross	\$1,454,243	\$1,194,372	I. \$259,871
1 "..... Net	554,709	378,847	I. 175,862

February 28:	1898.	1897.	Inc. or Dec.
Nashville, Chattanooga & St. Louis.			
1 month..... Gross	\$436,144	\$420,982	I. \$15,162
1 "..... Net	139,408	154,526	D. 15,128
8 months..... Gross	3,809,045	3,400,052	I. 408,993
8 "..... Net	1,347,054	1,302,975	I. 44,079

March 31:	1898.	1897.	Inc. or Dec.
New York Central & Hudson River (Estimated).			
3 months..... Gross	\$10,800,000	\$10,133,425	I. \$666,575
3 "..... Net	3,400,000	3,246,449	I. 153,551
9 "..... Gross	35,102,000	33,071,888	I. 2,030,112
9 "..... Net	11,580,000	10,690,826	I. 889,174

ADDISON & PENNSYLVANIA.—Judge Mitchell, in Wellsboro, Pa., March 7, entered a decree in behalf of Randolph Rodman, as Trustee, against this company for \$352,550, and the sale of the property of the company is to take place at the Court House in Bath, N. Y. This proceeding is ancillary to a proceeding already had in New York State. This road extends from Addison to Gaines, Pa., 41 miles, with a branch from Gurnee Junction, Pa., to Gurnee, 4 miles. It also leases the New York & Pennsylvania from Gaines to Galeton, Pa., 5 miles, making the total operated 50 miles. The company was reorganized in July, 1892, and a default was made on interest due June 1, 1895, on second mortgage bonds.

ATLANTIC & PACIFIC.—The land grant of this company in Arizona, amounting to about 1,500,000 acres, was sold under foreclosure at Prescott, Ariz., March 10, to E. Wilder, Treasurer of the Atchison, Topeka & Santa Fe, for \$6,500.

BLUE RIDGE & ATLANTIC.—The successor to this company was incorporated in Georgia, March 9, under the name of the Tallulah Falls. This road was sold recently to George Lewis Prentiss of New York, representing the holders of receivers' certificates. The road extends from Cornelia, Ga., to Tallulah Falls, 20.9 miles. A receiver was appointed March 14, 1892. (Feb. 18, p. 131.)

COLUMBUS, SANDUSKY & HOCKING.—At a recent meeting of the directors, a protest was adopted against granting authority to Receiver Felton to issue \$525,000 of receivers' certificates. The receiver asked for authority to issue certificates to this amount to cover \$306,000 of car trust obligations now due, and \$54,000 to mature June 30, making a total of \$360,000. The directors did not object to this portion of the issue but to the additional \$165,000 for the purchase of new freight cars.

CORVALLIS & EASTERN.—A mortgage has been recorded in favor of the Central Trust Company of New York for the issue of first mortgage bonds on this road not to exceed \$11,250,000. This company is the successor of the Oregon Central & Eastern and its line extends from Yaquina, Ore., east to Idanha, 141.8 miles. The company has under consideration the extension of the road east about 300 miles. (Mar. 11, p. 188.)

DULUTH, MISSABE & NORTHERN.—This company has given a deed for \$5,000,000 to the Central Trust Co. of New York to secure an issue of bonds of like amount, of which \$1,500,000 is for present indebtedness and the balance will be used to retire an issue of bonds made in 1894. The new bonds will be 5 per cent. 20-year, and the company reserves the right to take them up at any time on 90 days' notice at 105.

HARTWELL.—The purchasers of this road have reorganized, changing the name from Hartwell Railroad to Hartwell Railway. The road was sold at public auction Feb. 5 at Hartwell, Ga., to representatives of the bondholders and it extends from Hartwell to Bowerville, 10 miles. The new officers and directors are given in another column. (Feb. 18, p. 131.)

KANSAS CITY, WATKINS & GULF.—Henry B. Kane has been appointed Receiver of this road in the suit of the Farmers' Loan & Trust Company of New York and has taken possession of the property. The road extends from Alexandria, La., 98.37 miles to Lake Charles. (Dec. 17, 1897, p. 893.)

KANSAS MIDLAND.—Judge Thayer in the United States Circuit Court at Wichita, Kan., March 9, issued a decree of sale of this road under suit brought by the Mercantile Trust Co. of New York for \$1,700,000. The road extends from Wichita, Kan., to Ellsworth, 107 miles, and until July last was operated under lease by the St. Louis & San Francisco, but since that date has been operated by the receiver. (July 9, 1897, p. 500.)

KANSAS PACIFIC.—Judge Sanborn, at the United States Circuit Court, St. Paul, Minn., March 14, confirmed the sale of this line made at Topeka, Kan., Feb. 19. (Feb. 25, p. 149.)

LONG ISLAND.—The company gives notice that more than a majority of its capital stock has been deposited under the voting trust agreement of Feb. 1, 1897, with the United States Mortgage & Trust Company of New York, and that the remaining shares will be received on the same terms for which stock trust certificates are issued in exchange. This company has purchased nearly all the \$30,000 of capital stock of the Huntington Street Railroad, a line nearly three miles in length and bonded for \$25,000.

LOUISVILLE & NASHVILLE.—Judge Toney of Louisville, Ky., has sustained the suit of Adolph Schmitt, Trustee, for the holders of bonds of the old Cumberland & Ohio, Northern Division, against the Louisville, Cincinnati & Lexington and its parent company, the Louisville & Nashville. This decision was issued as a result of an appeal given some weeks ago and establishes the position that the Louisville & Nashville in taking possession of the Louisville, Cincinnati & Lexington assumed its liabilities as to the Cumberland & Ohio. Heretofore the Louisville & Nashville has refused to pay the bonds of the old Cumberland & Ohio, which had been guaranteed by the Louisville, Cincinnati & Lexington. The decision is for \$90,182.

MAMMOTH CAVE.—In accordance with the notice given in this column for Jan. 23, this road was sold at Louisville, Ky., March 7, to President J. Hill Eakin for \$16,000. The road extends from Glasgow Junction, Ky., to Mammoth Cave, 8.38 miles. It was chartered in 1874 and opened Nov. 17, 1886. A receiver was appointed Aug. 12, 1895. The road was mortgaged for \$100,000 and the sale took place because of the default in the interest on this debt. The road has been operated by the Louisville & Nashville.

MEMPHIS & CHARLESTON.—This company has received a new charter in Mississippi on account of the recent sale to the Southern and the reorganization. The line extends from Memphis, Tenn., to Stevenson, Ala., 272 miles, with a branch of 14 miles from Moscow, Tenn., to Summerville, and another branch of 6 miles from Tusculuma, Ala., to Florence. John W. Fewell, E. H. Gardner and Melville E. Ingalls are the incorporators. (March 4, p. 171.)

MIDLAND TERMINAL.—The stockholders have authorized the sale of \$400,000 of first mortgage 5 per cent. bonds to mature 1925. These are to replace other bonds and will reduce the yearly fixed charges to \$30,000. The bonds are taken by E. W. Rollins & Sons of Boston.

NASHVILLE, TELICO & CHARLESTON.—The court at Knoxville, Tenn., has declared null and void the \$180,000 bond issue of this company, and has appointed O. R. Brigham of Knoxville receiver in place of H. J. Englesing. (March 11, p. 190.)

NORTHERN PACIFIC.—Judge Jenkins, at Milwaukee, Wis., March 10, gave permission to the Oregon Iron & Steel Co. to file a claim for \$65,000 against this road, and issued an order to the railroad company to show cause within twenty days why the claim of the Oregon Co. should not be allowed. This claim has arisen in a legal fight for the possession of nearly 4,000,000 acres of land in Minnesota and North Dakota, the title of which is still in the old Northern Pacific Co.

OREGON IMPROVEMENT.—The reorganization committee gives notice to depositors of consolidated mortgage bonds and preferred and common stock that the sixth installment required under the agreement is now due and payable at the office of the Manhattan Trust Company of New York or the Old Colony Trust Company, Boston, on or before March 22. (Jan. 14, p. 36.)

PECOS VALLEY.—Judge Hamilton of the Fifth Judicial District at Albuquerque, N. M., March 13, entered a decree of foreclosure in the case of the Mercantile Trust Co. of New York against this railroad, and has appointed Judge A. A. Freeman of Eddy, N. M., as Master. The intention is to get the Pecos Valley out of the hands of a receiver as soon as possible so that work may be begun on the extension from Roswell, N. M., northeast 203 miles to Washington, Tex., a point on the Atchison, Topeka & Santa Fe. (March 4, p. 170.)

PHILADELPHIA, READING & NEW ENGLAND.—The First Mortgage Bondholders' Committee, consisting of George A. Fletcher (Chairman), Charles-magne Tower, Jr., Arthur Brock, Henry L. Davis, Henry O. Selas, H. H. Pigott, Robert M. Janney, John W. Hamer (Secretary), John Sailer, Joseph Moore, Jr., and William H. Jenks, has prepared for submission a plan and agreement, copies of which may be obtained of the Fidelity Insurance, Trust and Safe Deposit Co., Philadelphia. The main points are as follows:

It is proposed to foreclose the present first mortgage and to create and issue new securities. The lease of the Hartford & Connecticut Western Railroad to remain undisturbed. The lease of the Dutchess County Railroad to be retained only upon the reduction of the rate of interest upon the bonds of that company to 4 per cent. Provision is made for the construction of a branch line to or near Springfield, Mass.

Assessments will be required to be paid as follows: Upon the series "A" bonds, 10 per cent.; upon the series "B" bonds, 8 per cent.; upon the preferred stock, 8 per cent., and upon the common stock, 2½ per cent., for which payments the new first mortgage bonds will be given at par. Ten per cent. of the assessment must be paid on deposit with the trust company and the balance will be payable as called for by the committee; not more than 25 per cent. at any one time and not oftener than at intervals of thirty days, of which fifteen days' notice shall be given.

A syndicate has underwritten the payment of the assessments on the income bonds and stock of the company and will acquire the rights of the holders of assessed securities who do not deposit them and pay the assessments thereon. The time within which securities may be deposited is limited to April 16, 1898.

This road was formed Aug. 1, 1892, as a consolidation of the Poughkeepsie Bridge Co. and the Central New England & Western Railroad Co. It was controlled by the old Philadelphia & Reading and was operated by the Reading receivers until Aug. 13, 1893, when it was turned over to a separate receiver, the guaranteed interest due May and Au-

gust, 1893, having gone to default. The main line of the road is from Campbell Hall, N. Y., to Silver Nails, 57.6 miles. The company has leases of the Hartford & Connecticut Western, 109.75 miles, and the Dutchess County, 12.4 miles. It has trackage rights over the Newburgh, Dutchess & Connecticut to Millerton, N. Y., 1.25 miles, making the total length operated 181 miles. There is \$4,600,000 common stock and \$2,000,000 preferred stock. The funded debt is \$11,100,000, as follows: First mortgage 5 per cent. bonds, due Nov. 1, 1942, \$1,000,000; similar 4 per cent. bonds, \$6,250,000; series "A" 5 per cent. income bonds, due Oct. 1, 1952, \$1,750,000; series "B," similar bonds, \$2,100,000.

ST. LOUIS, AVOYELLES & SOUTHWESTERN.—Judge Aleck Boardman of the United States Court at Alexandria, La., has deposed H. J. Fitch of Marksville, La., as one of the receivers and appointed W. H. Peterman, of the same city, in his stead. Mr. Peterman is President of the company. This road extends from Bunkie, La., to Simmesport, 26 miles, with a branch from the main line to Marksville, 10 miles. Receivers were appointed on July 24, 1896. (Feb. 12, 1897, p. 124.)

UNION PACIFIC.—The controlling interest in the capital stock of the Oregon Short Line is reported to have been purchased by the Union Pacific. The total capital stock of the Oregon Short Line is \$27,460,100, of which \$5,460,000 was purchased last December by the reorganization committee of the Union Pacific. The Jewelsburg branch of the Union Pacific, Denver & Gulf, extending from La Salle, Colo., to Jewelsburg, 151.53 miles, is also to become the property of the Union Pacific. When the Union Pacific is fully reorganized under this arrangement, it will have the following lines:

	Miles.
Main line, including Kansas Pacific and Denver Pacific	1,822.59
Oregon Short Line	1,429.70
Leavenworth, Kansas & Western	165.35
Union Pacific, Lincoln & Colorado	226.35
Jewelsburg Branch of the Union Pacific, Denver & Gulf	151.53
Omaha & Republican Valley	482.04
Total	4,276.56

The reorganization committee has issued \$59,250,000 of non-accumulative 4 per cent. preferred stock, and will issue an additional \$15,750,000, making the total \$75,000,000; it has also issued \$61,000,000 of common stock. The 4 per cent. first mortgage bonds already issued amount to \$71,235,000, which will be increased to \$90,000,000. The Union Trust Co. of New York has begun payment of the certificates of deposit for Union Pacific collateral trust 6 per cent. bonds, including principal and interest to March 11, less one-half of 1 per cent. of the par value of the bonds to be retained for expenses.

WAYCROSS AIR LINE.—This road, according to report, has been sold to J. S. Bailey & Co., of McDonald's Mill, Ga., and the purchasers propose immediately to begin the extension of the line from Nicholls, Ga., west 12 miles to Douglas, where connection is made with the Douglas & McDonald. The present road extends from Waycross, a point on the Savannah, Florida & Western line of the Plant System, northwest 30 miles to Nicholls.

WISCASSET & QUEBEC.—Judge Whitehouse, upon petition of certain bondholders, has issued an injunction to restrain this company from issuing more bonds. The road is being extended from Albion, Me., north 11 miles to Burnham, and is being operated from Wiscasset, Me., north 43.5 miles to Albion. (Jan. 21, p. 51.)

WISCONSIN CENTRAL.—A suit was brought against this company at Milwaukee, Wis., March 11, on behalf of Mark T. Cox of Morristown, N. J., a stockholder of the Central Car Co., organized under the laws of Connecticut. This company leased to the Wisconsin Central rolling stock to the value of over \$3,000,000. When the receiver took possession an appraisal found this stock and motive power to be worth but \$1,398,690. The Connecticut laws forbid dividends to be paid by corporations whose capital is impaired and the company refused to pay dividends. Mr. Cox wants the Wisconsin Central receivers to make good the loss on the rolling stock. This suit will probably tend to delay the reorganization. (Jan. 21, p. 52.)

TRAFFIC.

Traffic Notes.

The Canada Atlantic Railway, which is establishing a lake line, has opened a freight office in Milwaukee.

About 250 boatloads of coal were floated down the Ohio River from Pittsburgh on March 13. The water was not high enough to float the largest boats.

The Grand Trunk Railway has advertised in Liverpool asking bids for steamship lines from Portland, Me., to Liverpool, to Bristol, to London, to Glasgow and to Hamburg.

A trainload of cotton (29 cars) was recently taken from Texas to Tacoma by way of Kansas City, Mo., and Billings, Mont. The freight was destined to Japan. The steamship Tacoma, which carried this cotton, also had 250 carloads of steel rails from the Illinois Steel Company.

Fruit growers of Southern California complain that at the present very low prices of oranges they cannot afford to ship anything but the best grades, and that unless the freight rate of \$1.25 per 100 lbs. to the Atlantic seaboard is reduced they will have to leave 3,000 carloads of seedling oranges hanging on the trees.

The United States Supreme Court, in an opinion by Justice Harlan, has decided the case of the Missouri, Kansas & Texas vs. Haber, affirming the constitutionality and validity of the laws of Kansas prohibiting the transportation into the State of cattle affected with Texas fever, and providing for a civil action for damages in case of the infraction of the law.

The Managers of the Joint Traffic Association have issued their recommendation in the matter of lake line differentials on freight rates for the coming season. Eastbound the basis recommended, Chicago to

New York, is 12 cents below the all-rail rate on first-class and 3 cents on grain. Westbound the basis is 21 cents first-class, the same as heretofore. Differentials are also prescribed to and from Detroit, Toledo, Philadelphia, Baltimore, etc.

The two trainloads of reindeer belonging to the Government, recently taken across the Continent by the Pennsylvania, the Chicago, Milwaukee & St. Paul and the Great Northern, were run from Jersey City to Seattle, 3,132 miles, in 129 hours, equal to nearly 25 miles an hour. There were 19 cars in each train. There were ten cases of measles among the children of the Lapp attendants when the party left New York and 26 cases when they arrived at Seattle.

The movement of passengers to the State of Washington since the radical reduction of rates of a month ago has been active and continuous. Agents at New York say that there is as yet no falling off. A late Seattle paper estimates the number of passengers arriving in that city at 400 daily. A Pittsburgh (Pa.) paper reports that the passenger agents in that region are finding a very much smaller number of passengers for Alaska and Klondike than they expected.

The adjourned meeting of the Joint Passenger Committee for the consideration of the Canadian Pacific question convened in New York March 15. The Western and Trans-Continental lines were represented, also the Southwestern and New England lines. The Canadian Pacific was represented by Passenger Traffic Manager McNicoll, the Grand Trunk by General Passenger Agent Davis, the Great Northern by General Passenger Agent Whitney and the Northern Pacific by General Passenger Agent Fee. A committee was appointed, consisting of Messrs. Martin of the Baltimore & Ohio for the Trunk lines, Hanson of the Boston & Albany for the Northeastern Passenger Association, Heafford of the St. Paul for the Western Passenger Association, Whitney of the Great Northern for the Trans-Continental Association, and Ford of the Pennsylvania lines. This committee met in conference with the representatives of the Grand Trunk and Canadian Pacific. Up to the hour of going to press the committee has not presented its report. The general impression is that this conference will result in the formulation and acceptance of a plan which will put an end to the controversy over rates to North Pacific coast points.

Chicago Traffic Matters.

Chicago, March 16, 1898.

Both the St. Paul and the Missouri, Kansas & Texas have now withdrawn from the Western Joint Traffic Bureau, and the presidents of the other lines interested in the bureau have decided to abandon it.

All the lines interested in the flour-rate war have agreed to a restoration of the rates on March 21. From St. Paul and Minneapolis to this city the proportional rate on seaboard shipments under the new tariff will be 10 cents per 100 lbs. On other flour the rate will be 12½ cents.

The question of excess fares between Chicago and Denver has been referred to Chairman Caldwell of the Western Passenger Association to arbitrate, the general passenger agents failing to come to any understanding.

Rates on packing house products from the Missouri River to the Mississippi, and from St. Paul and Minneapolis to Chicago are to be restored to the normal basis on the 28th.

East bound rates continue demoralized. From the Mississippi River and from Chicago the rates are now practically the same. It is said that the B. & O. last week quoted a rate from this city to Baltimore of 16 cents on provisions, as against the regular tariff of 27 cents. Flour, grain and provision rates are also being cut.

The Western Passenger Association has backed down from the ultimatum it announced a couple of weeks ago, that it would refuse to grant any excursion rates for conventions pending the action of Congress upon the anti-scalping bill, and is now authorizing those rates as usual.

Shortage of freight cars continues to be a great source of annoyance to both the Eastern and Western roads. One Eastern line reports that it is short some 5,000 cars. But in the face of this state of things complaint is made that there is no profit on the traffic at the present low rates.

There is a perceptible improvement in the livestock business in and out of Chicago within the last two months. During February the receipts increased nearly 1,200 cars and the shipments about the same.

The war over North Pacific coast passenger rates has assumed a new phase. The Western roads seem to be suing for peace, and hoping that the Canadian Pacific will meet them half way. At the present time a \$10 rate is being made from St. Paul to Seattle, and a like rate is in effect from Omaha and Kansas City. So far only the roads west of Chicago and the Grand Trunk have become involved in the disturbance, but the Eastern trunk lines are likely to be drawn into it, as the Grand Trunk, which is vigorously fighting the Canadian Pacific, is taking from them not only considerable transcontinental business, but also a large amount of the regular traffic, originating in the East for the middle West.

Roads west of the Missouri River have agreed to cease paying excessive commissions on Pacific coast business. They have been paying \$5 on all tickets, but they have decided to pay only the regular normal commissions, at least on the business of the current month.

Eastbound shipments from Chicago and Chicago Junctions to points at and beyond the Western terminal of the trunk lines for the week ending March 10 amounted to 203,538 tons, as compared with 191,870 tons the preceding week. This statement includes 118,005 tons of grain, 31,938 tons of flour and 18,424 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

	Week Ending March 10.		Week Ending March 3.	
Roads.	Tons.	P. C.	Tons.	P. C.
Baltimore & Ohio	15,817	7.8	13,642	8.3
C. C. & St. Louis	15,809	7.8	15,845	8.3
Erie	19,386	9.5	20,607	10.7
Grand Trunk	22,167	10.9	20,414	10.6
L. S. & M. S.	30,633	15.1	33,161	17.3
Michigan Central	24,285	11.9	19,230	10.0
N. Y., Chl. & St. L.	23,466	11.5	22,278	11.6
Pitts., Cin. Chl. & St. L.	15,067	7.4	12,780	6.7
Pitts., Ft. Wayne & Chl.	24,870	12.2	24,150	12.6
Wabash	12,038	5.9	9,763	5.1
Totals	203,538	100.0	191,870	100.0